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ABSTRACT

This study explored the relationship between innovations in communication services and changes in other forms of socio-economic behavior. It focused on five communities in the Eastern Arctic and a control community in Northwestern Ontario, each with a different level of communications service. Interviews were conducted, and time-series data were collected on 40 variables ranging from "telephone installations" to "food sales" to "school pupils." The latter information was analyzed via a comparison of standardized data in graphical form. The analysis indicates that: (1) natives use the communication services in the same way as non-natives, (2) there is a general transition away from "traditional" ways of life in the economic and educational spheres, (3) the number of telephones is associated with the level of food sales, and (4) the degree of change in communication service (telephone) is related to the level of subscriptions when the exchange is upgraded. A complete list of the variables studied and the interview protocol are included. (Author/DAG)

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IMPACT OF COMMUNICATIONS SERVICES IN THE EASTERN ARCTIC

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FINAL REPORT: 15 MAY 1975

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SYNOPSIS

Social development in the far north has been influenced in the past few centuries by a number of forces largely originating in external cultures undergoing rapid industrialization. Search for a route to the East has been superseded in turn by the hunt for furs and whale oil, the thrust to establish hegemony by North American governments, and the quest for mineral wealth. A most visible effect of these tides has been a radical change in the technology available to northern residents.

Technical change has been particularly striking in the communications services area. This study has explored the relationship between innovations in communication services and changes in other forms of socio-economic behaviour. The study focussed on 5 communities in the Eastern Arctic and a control community in Northwestern Ontario, each enjoying a different level of communications service. Interviews were conducted, and time-series data was collected on 40 variables ranging from "telephone installations" to "food sales" to "school pupils". The latter information was analyzed via a comparison of standardised data in graphical form.

The analysis indicates that native northerners are using the full range of communication services available in much the same way as non-natives. There is evidence of a general transition away from "traditional" ways of life in the economic and educational spheres. There is a weak indication that the number of residential telephones is associated with the level of food sales and a stronger indication that the number of business telephones is associated with the level of sales of dry goods.

Technological change in communications service does not necessarily lead to an increase in the use of the service. The important factor appears to be the degree of change, for communities with relatively "mature" telephone services do not show much change in the level of telephone subscriptions when the exchange is upgraded to dial service. On the other hand,

communities with minimal telephone service do show abrupt growth in subscriptions when the same upgrading occurs. It is possible that there are levels of demand for communications services which can be diverted to the telephone service by technical improvements; otherwise other services (particularly mail) seem to carry much of the communications load.

CONTENTS

PREFACE IV
FOREWORD: WHAT IS TECHNOLOGY ASSESSMENT? VI

CHAPTER 1: BACKGROUND.................................... 1

The Traditional Society 2
The European Advent 4
Telecommunications Services 6

CHAPTER 2: AN INTRODUCTION TO THE STUDY 9

Theoretical Considerations 10
Design 14
Practical Problems 16

CHAPTER 3: ANALYSIS OF THE DATA 21

Section 1: Sioux Lookout 24
Section 2: Frobisher Bay 37
Section 3: Igloolik 53
Section 4: Cape Dorset 67
Section 5: Clyde River 81
Section 6: Comparison across Communities 93
Section 7: Interview Data 106

CHAPTER 4: DRAWING CONCLUSIONS 112

Conclusions 113
Epilogue 119

REFERENCES 121
APPENDIX A: LIST OF VARIABLES 124

APPENDIX B: THE INTERVIEW PROTOCOL 130

PREFACE

This, the Final Report, begins with a summary of some of the information presented in the two previous reports (Chapter 1).

Chapter 2 deals with some of the theoretical issues underlying research on the interrelation of communications services and socio-economic behaviour. The design and methods used in the present study are outlined, and problems encountered in carrying out the study are discussed.

Chapter 3 presents the time-series data in a graphical form. Each of the first 5 sections deals with one of the communities under study, and the 6th section compares the five communities, one variable at a time. Initial analytic comments on the graphs are made in these sections. Finally, the 7th section summarizes the results of the interviews.

An attempt is made in Chapter 4 to bring the observations made in the preceding chapter together in order to draw meaningful conclusions. Final comments and recommendations for further research are made in the epilogue closing this chapter.

A list of variables and a copy of the interview protocol are contained in Appendices A and B.

A great number of people in libraries, government bureaux, and private companies contributed their time and insight to the study. We are indebted to them all.

Of course, residents of the Eastern Arctic contributed not only their time, but their insights as well. Hopefully, if anyone is to benefit from this work, it will be those who have borne another round of inquiry.

T.C. Cheng and Wayne Mercer are responsible for gathering, manipulating, and tabulating the wealth of data which underlies this report.

Finally, thanks are due to the secretaries who have had to struggle with the manuscript.

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FOREWORD: WHAT IS TECHNOLOGY ASSESSMENT?

On the surface, the answer to this question, "what is technology assessment?" seems straight forward: technology assessment is a determination of how well an application of knowledge achieves specified goals, with special attention to the ancillary effects of achieving these goals. Note that this very general description involves applied knowledge, goals, and evaluation. It is with respect to these terms that the concept of technology assessment broadens to encompass very diverse types of activity, for "applied knowledge" may take the form of a recipe for baking a cake, a method of teaching, or a machine for flying faster than sound; "goals" may be explicit (better cakes) or implicit (better nutrition), technical (flying faster) or non-technical (saving man-hours); and "evaluation can be attempted through a variety of methods, from guesswork to ergonomics to market research to dynamic modelling. In view of these dimensions of variation, it is not surprising that a great number of diverse activities might be labelled "technology assessment".

In current practice, however, the term is used to describe evaluation with respect to non-technical goals: social well-being, economic development, ecological stability, and so on. Unfortunately, the term has accidentally acquired negative connotations - technology assessment is usually carried out to make sure that the product or project will not poison the environment, the economy, or the mind. Technology assessment can equally be a positive endeavour in so far as it explores the real needs of society on the whole, rather than the wants of some of its constituents.

Technological assessment is often carried out in the course of systematic planning and forecasting - it is addressed to events in the future. This is, of course, a difficult task, for "technology has this essential nature, that it opens up new degrees of freedom, new modes of action, which hitherto may not even have been physically, economically, or even conceptually possible." (CHERRY, 1972, p. 98.) While we may have some inkling of what the physical or economic effects of technological change will be, we cannot by definition conceive of the unconceivable! It is easier to work with the past, and there is a good example of this approach in the work on the video-telephone (DICKSON and BOWERS, 1974). The present research also looks into the past, rather than the future. If part of the objective in current research is to validate methods for technology assessment, it is far wiser to look at the past, or the near future, so that predictions can be compared with actual outcomes.

Since technology assessment encompass a range of activities, it is not realistic to expect that there should be a single method of evaluation applicable in all cases. Obviously, the method should be tailored to the task. A source of data must be found, a means of processing it selected. Data may be "hard", numerically continuous (derived from statistical records or experiments where real measurement is possible) or "soft", qualitative, discrete (derived from interviews, questionnaires, or expert opinion). Secondly, processing the data to permit inference and conclusion may involve the application of parametric or non-parametric statistics, dynamic modelling, cross-impact matrices, or discontinuity analysis.

If there is any generality to be made on the subject of method, it is that there is no simple option. As noted earlier, technology assessment means evaluation with respect to specified goals. When the goals become non-technical, the type of information upon which the evaluation must be based becomes increasingly complex. If our goal is to build a bridge over a river, we can measure breadth and depth of the water and decide how long and high the bridge should be. We can also measure soil consistency, spring floods, and so on, to allow for chance variation in our specifications. However, when we come to goals like economic development or social well-being, few will argue that there is a simple measure of how well we reach that goal. And there is much more room for variation in the measures that are proposed. Technology assessment moves on the frontiers of our ability to codify complex variation.

The project reported here has attempted to examine the impact of rapid change in communications services upon social and economic behaviour of residents of the Eastern Arctic. One should not expect the impact to be simple, like one billiard ball striking another; rather, one expects far-reaching interrelationships among several variables, as in the "break" after the cue-ball has struck.

If full-scale technology assessment involves up to 6 person years and a cost of $250,000 (DICKSON and BOWERS, p. 5), the present project is relatively modest. With roughly 2 person years of effort, this project can only attempt to collect some basic data, and derive from it a few tentative hypotheses on the interrelation of socio-economic and communications variables.

The difficult task of imputing "cause" to one of the interrelated variables and "effect" to the other must be left for later.

CHAPTER 1

BACKGROUND

THE TRADITIONAL SOCIETY

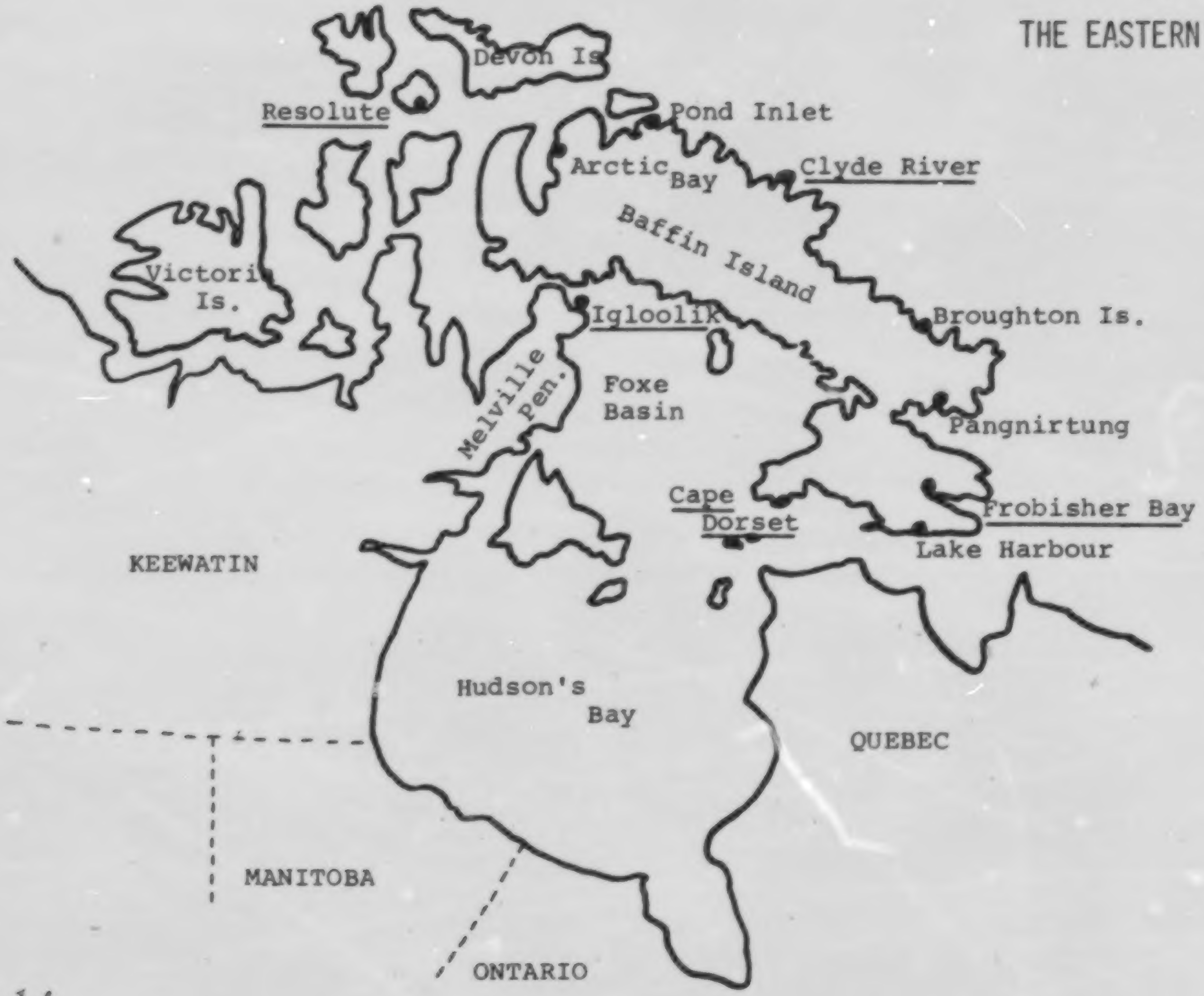
Social development in the far north has been influenced in the past few centuries by a number of forces largely originating in external cultures undergoing rapid industrialisation. Search for a route to the East has been superceded in turn by the hunt for furs and whale oil, the thrust to establish hegemony of North American governments, and the quest for mineral wealth. A most visible effect of these tides has been a radical change in the technology available to northern residents.

The native Inuit economy was entirely based upon animal life - primarily caribou, seal, and fish. Hunting provided, not only the staple diet, but virtually all other necessities as well: hides for clothing, tents, boats, containers; bones for weapons, tools, construction materials; fats for heat and light.

Survival of the Inuit depended upon detailed knowledge of the "life - styles" of the animal population: times and places at which caribou, seal, or whale were likely to appear; time and place at which seals would be using a breathing hole in the ice or basking on the ice floes. This intimate interlock with living resources meant that hunting parties had to be mobile. Travel over hundreds of miles proceeded by dog-team or large canoe. Since return to a central camp was impractical, "home" was the site of the tent or igloo until another move became necessary. Movement tended to be cyclic, so that temporary "camp" might be located at the same site, year after year. In some cases, in some cultural groups, the camp might be built of stone and turf.

The low density of game further required that the hunting units remain small, usually consisting of one or two families. Two to twelve families, united by kinship might occupy an area of several hundred square miles capable of providing a full range of game. Only in rare instances, when ceremony or trade demanded, did the Inuit congregate in groups of one or two hundred at a single place. Due to the various constraints imposed by this way of life, population of the far north (it is estimated) remained stable for hundreds, perhaps

MAP 1
THE EASTERN ARCTIC


Devon Is
Resolute
Pond Inlet
Arctic Bay
Clyde River
Baffin Island
Victoria Is.
Igloolik
Broughton Is.
Melville Pen.
Foxe Basin
Pangnirtung
Cape Dorset
Frobisher Bay
Lake Harbour
KEEWATIN
Hudson's Bay
QUEBEC
MANITOBA
ONTARIO

thousands of years before the appearance of Europeans. Then, with the introduction of new diseases, population fell considerably, and has only climbed above traditional figures in the last few decades.

THE EUROPEAN ADVENT

Explorers reaching the "Northwest Passage" to the orient made the first significant contact with the Inuit. At the end of the 18th century, contact became more regular, for fur traders and whalers followed close on the explorers' heels (or sterns). Fur traders under the flag of the Hudson's Bay Company established their lonely posts along the coasts and waterways. In the nineteenth century, whaling was the dominant industry in the north, until petroleum displaced blubber and whale bone as the source of fuel oils and plastic materials. Although the whalers disappeared overnight, the Hudson's Bay men have stayed on, for their basic activity is trading.

The European incursion had three major effects on the Inuit: introduction of new diseases, depletion of biological resources, and technological revolution. Only in the third case can there be any argument that the incursion has brought benefits.

The Inuit tool technology - bone, bow and arrow, spear - was quickly subverted by iron, the rifle, the harpoon. Generally, the Inuit were very amenable to innovations in an environment which had few material comforts. The wooden house, its stove and other knick-knacks of the industrialised culture caught on. But the immediate effects were mixed: the gun permitted killing-at-a-distance, but increased the losses of sea-mammals, since they often sink after the bullet hits; the hot, crowded, and enclosed house accelerated the spread of infectious disease. The vicious interplay of a receding natural resource and increasing disease reinforced the Inuit's dependence upon Kadlunat ("whiteman") technology.

Only in the early 20th century did the Canadian government make an official appearance on this scene - chiefly through the patrols of the R.C.M.P. The presence was low key, until international demands for security poured men and money into the DEW line across Arctic Canada. Inuit found employment in the construction phase, and encountered machines, the wage economy and other habits of industrialised people on a large scale. As these jobs waned with the construction phase, the Canadian government assumed a more active role in northern affairs. In 1960, a federally-sponsored report which attributed high infant mortality and disease rates to the poor quality on Inuit housing touched off a program which has had the most dramatic effect on life in the Arctic.

In 1965 the Federal Rental Housing Program was established. Over a five-year period, it would bring 1600 new houses to the Inuit, at standards established for non-Inuit in the Arctic, with rent scaled to the tenant's ability to pay. Essential furniture, electricity, water, fuel oil, sewage and garbage services were all included. The comprehensive scheme also provided courses for adults in hygiene, housekeeping, home economics, and so on. Provision was made for tenants to gain ownership of their homes, and for the new community to establish a Housing Association which would assume responsibility for allocation of houses and management of the whole program.

In 1964, the price paid for sealskins shot downward, and a major source of income evaporated. The housing program offered an immediate alternative to life on the land, and so new Inuit communities sprang up overnight. Igloolik illustrates this sudden change: between 1962 - 1964, the Federal Government provided 9 new houses for Inuit at this site; in 1965, 29 houses arrived and 32 more came in the following two years. In 1960, a total of 491 Inuit were counted in the hunting hinterland surrounding Igloolik and Hall Beach; by 1968, 430 Inuit were located in the town of Igloolik, 230 in Hall Beach, while only 30 remained in hunting camps. This pattern of townward migration, followed by rapid population growth, spread across the north.

Technological change has played an important role in the social history of the north. The arrival of guns and iron tools greatly affected the style and success of the hunt. Ski-doos and outboard motors increased the range of the hunter, facilitating the shift from nomadic to a more sedentary way of life, but also increasing dependence upon wage employment. The Kadlunat house and all its services exerted its own inducements to urban life. Whaling boats, power plants, and other major undertakings required adaptation of the traditional kinship group to the demands of broad co-operative action.

Technological change has altered the relation between Inuit and Kadlunat societies. As sailing ships turned to steel and steam, trading goods appeared in greater numbers, with greater regularity. The pace of change speeded as the use of radio and airplane became common-place in the industrialised south, particularly during the Second World War. This new capability to act and react by moving materials and men greatly increased the impact of the Federal Government. Administrators, policemen, mechanics, spare parts, food could be flown in, students and patients flown out; all could be coordinated via crackling airwaves. And in the communications sphere too, the innovators were far from dormant.

TELECOMMUNICATION SERVICES

The desire for telecommunications development in the north has been moulded by two goals: reaching neighbouring communities, and reaching the south. In both cases, vast distance is the obvious barrier; atmospheric and ionospheric interference are perhaps not so obvious impediments. Until recent times, personal communication within the typically small settlements has not required technical aid. As settlements grew, local exchanges were installed. These are the type of wired exchange that might be found in any small town.

It is in providing long-distance service between communities, and later between exchanges, that the most striking changes have been made. Several types of technology are in use; it should be noted that all of these currently contribute in their own ways to the extensive system in the Eastern Arctic, and are likely to do so for some time. Diagram 2.1 indicates past and present services available in each of the communities under study (see DESIGN section in Chapter 2).

1. HIGH FREQUENCY RADIO

In the simplest case, HF radios provide a unidirectional audio path in the 2-30 Megahertz range. The set cannot receive and transmit at the same time. Therefore, the users must sequence their speaking and listening activities - by ending each message with the traditional "over". For the most part, private HF systems operate along these simple lines. A number of systems are operated by commercial companies, government bureaux, and churches for their own use. However, anyone with a set can tune in.

In more sophisticated systems, one audio path in each direction is provided. This permits the radio-link to be connected to trunk telephone circuits. Such a technique is used by Bell Canada to link the single phone or the exchanges in remote communities, (e.g., Clyde River, Cape Dorset) to the larger telephone network.

2. VERY HIGH FREQUENCY (VHF) RADIO

VHF systems in the 30-3000 Megahertz range offer better quality and higher reliability in the radio-telephone application than HF. However, the range of VHF signals is considerably shorter than HF (30-100 versus 600-1000 miles). VHF is used by Bell Canada to link peripheral communities to a central base-station lying at the end of the national telephone networks,and by private operators, especially for communication with mobile units.

3. TROPOSCATTER

Troposcatter is a method of extending the range of VHF signals (to 600 miles) by refraction in the lower atmosphere. Because much of the original signal strength is dissipated in this process, troposcatter systems require powerful transmitters and collosal antennas. Hence, they are expensive to build and maintain.

Several strings of troposcatter stations were built for military applications, linking the DEW line stations to one another and the south. Subsequently, some lines were acquired by Bell Canada for public use in the public long-distance network.

4. POINT-TO-POINT

Strings of line-of-sight repeaters form the backbone of high-quality interurban transmission in the south. Operating in the 130-7000 Megahertz band, these "microwave" stations are located at 30-40 mile intervals.

Because of its dependence upon transportation for placement and maintenance, the microwave chain has been confined to more accessible parts of the north (e.g., the Mackenzie Valley). Terrestrial chains are inherently ill-suited to the vast expanses of tundra, sea, and ice in the Eastern Arctic.

5. Satellite Systems

The satellite can be viewed as a microwave repeater which has been shot high enough in the air to be able to "see" both the origin and destination of the signal. Anik thus overcomes the difficulties of terrain encountered in the Arctic. Secondly, because it is so high, Anik can "see" a great number of potential transmitters and receivers at the same time. This gives it great flexibility in routing messages.

Anik receives and transmits in the 4000-6000 Megahertz band. With this bandwidth, quality and reliability is high, for frequencies in this range are relatively immune from ionospheric and atmospheric disturbance. The bandwidth also provides a variety of service - Anik means that network-quality telephone, television, and radio can be made available to communities in the Eastern Arctic for the first time. In the case of telephone, long-distance calls must be mediated by operators in Frobisher Bay and Ottawa. Television and radio programs from the CBC Northern Service in Montreal are re-broadcast in Frobisher Bay only.

6. Broadcast Media

Apart from the satellite service available in Frobisher, the only broadcast medium in the Eastern Arctic is short-wave radio, beamed from Montreal. Quality and reliability are poor. Some attempts are currently being made to establish small stations to be programmed and operated locally.

7. Data Transmission

Generally, systems effecting person-to-person communication have been adapted for data transmission. HF radio provides data transmission at 100 words per minute. Where possible, the user is linked into standard networks via telephone lines.

BIBLIOGRAPHY

For readers wishing to explore the Arctic's past on their own, the following selections from the REFERENCES Section (see end of report) are highly recommended:

BISSET, 1968; CROWE, 1970; CROWE 1974; HIGGINS, 1968; HONIGMAN, 1965; STEFANSSON, 1951.

CHAPTER 2

AN INTRODUCTION TO THE STUDY

THEORETICAL CONSIDERATIONS

Our simple model of the relationship between communication services and behaviour focuses upon the telephone and its interrelations with economic, substitutional, and social events (see DESIGN, Diagram 1.2). "Substitutional events" are actions that are conceivably interchangeable with telephone calls - travelling or sending letters, for instance. To date there has been much discussion and little empirical analysis of the interrelation of communication services and these areas of behaviour.

ECONOMIC BEHAVIOUR

Direct and indirect effects of change in communication services upon economic behaviour can be anticipated. The telephone may directly facilitate the flow of information - and hence, the flow of goods and money - between producers and retailers, retailers and customers. Additionally, the telephone may, by facilitating social contact in a broad sense, contribute to an institutional climate favorable to economic growth. The latter theory has been developed and assessed with reference to mass media in developing countries (see, for example, PYE 1967). Unfortunately, most of this literature, including the empirical studies (e.g., LERNER, 1958) is weakened by the authors' assumption that particular features of modern industrialised societies must serve as the mileposts for societies developing at a different time, from a different starting point (for a detailed critique see GOLDING, 1973).

One study in this genre (SCHRAMM and RUGGLES, 1967) has some similarities in approach to the present study. The authors tested Lerner's 1958 hypotheses that literacy only rises when 10 percent of the population of a country lives in cities of 50,000 or more; that thereafter, urbanisation and literacy rise conjointly; and once the country reaches 25% literacy this variable shows highest correlation with "media consumption". In refuting the first two hypotheses, the study examined correlations between literacy, media consumption (number of radios), numbers of primary school children, and economic variables (GNP, steel production). The use of such uninformative data casts some doubt on the findings; however, it is certainly necessary to use data of this type (which is available on many countries) if samples large enough for formal statistical analysis (e.g. factor analysis, cross-lag correlation) are to be collected. The study confirmed the "established relationship" between media consumption and economic and social variables. In the present case, the relationship can perhaps be examined more explicitly, since economic and social measures are made on a more microscopic scale, and media consumption can be more precisely gauged when the medium is the telephone.

SUBSTITUTIONAL BEHAVIOR

It is conceivable that some forms of communication services, particularly the telephone, may substitute for other forms of behaviour, particularly travelling and sending letters. According to this theory, transmission of voice and/or data can perform some of the functions of a face-to-face meeting. It would be unrealistic to expect total substitution of one form for the other; but travel, mail volume, and telephone should not show parallel changes if the theory holds.

The travel/telecommunication tradeoff has been empirically examined by the Communications Study Group at the University of London in the context of office relocation. In this the focus is upon travel and telephone habits of office workers; diaries, questionnaires, and behavioural experiments are the primary methods. Similarly, C.R.C. and Bell Canada have conducted some research in this area. From the little information that has been published on all this work (see for example DAY, 1973; C.S.G., 1971), one gathers that there are some features of face-to-face meetings which travellers are not willing to lose to telecommunications services. For the possibly small proportion of travel which might be given up,ameliorated voice, graphics, and data transmission seem to be the desired substitute.

In the Eastern Arctic travel is expensive, time consuming and fairly arduous, due to uncertainties of the weather. Although the Inuit tend to have friends and relatives spread over distant communities and are relatively mobile, and although the non-native population tends to have strong ties to the south it is possible that "substitution" will be much more attractive in this area. To some degree our data on LD call frequency and air traffic will permit an examination of this possibility. Unfortunately, we have no direct information on the frequency of "visiting" within communities or the frequency of local calls. There is some evidence that telephone calls are replacing a lot of trips around town - especially when even a short walk requires bundling up to face sub-zero temperatures.

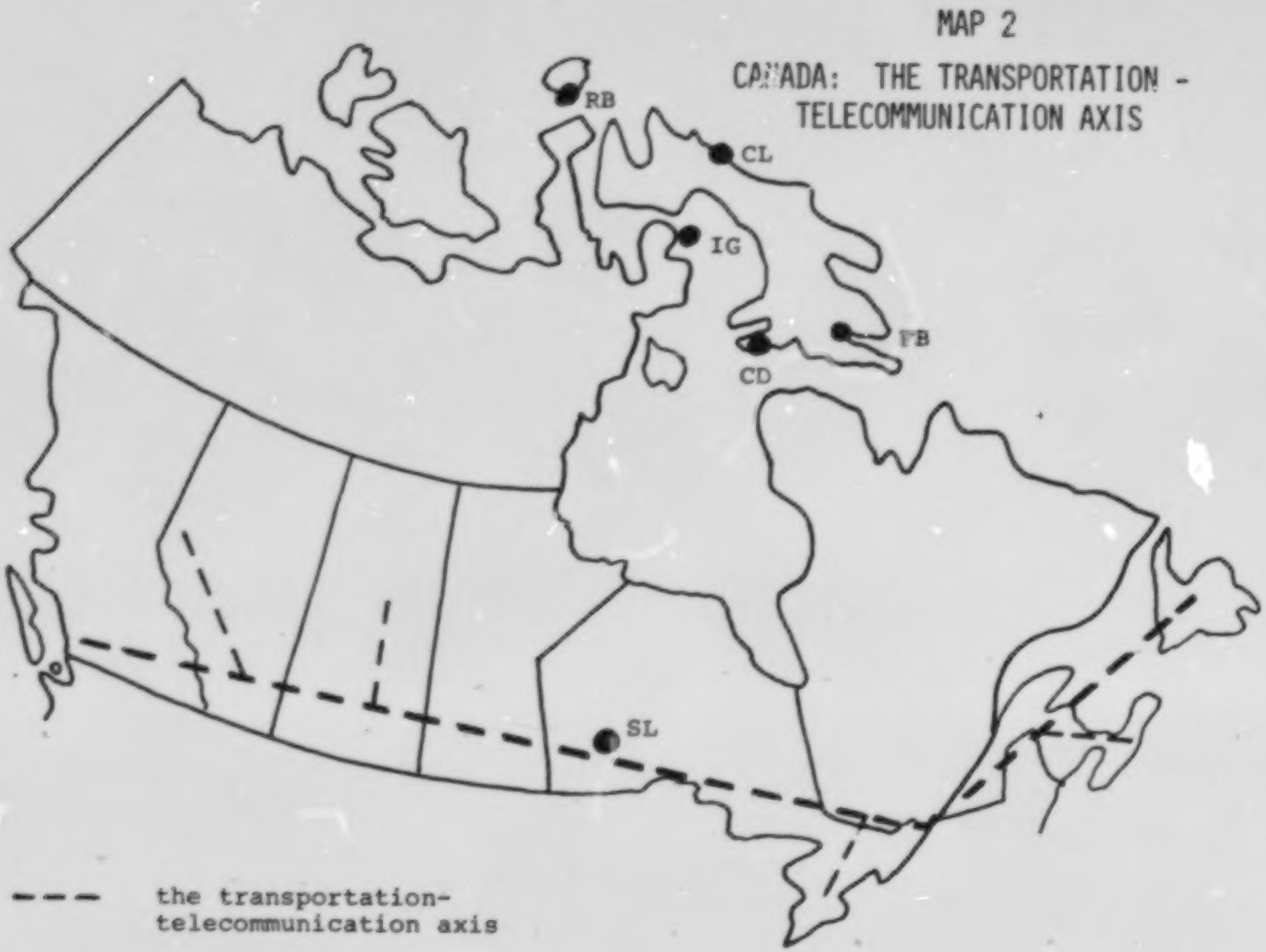
SOCIAL BEHAVIOUR

That mass media may affect social behaviour has been generally accepted. Radio, and television in particular have been implicated in the death of the cinema, the waning of literacy, the growth of violence, the rebirth of the cinema, the spread of literacy, and so on. No attempt to review the extensive literature on media effects will be attempted here. As we have seen, much of the discussion of the media in relation to literacy, education, political development arises in formulations of the ideal route to industrialisation for developing countries (see PYE, 1963, for example).

Other communication services, such as the telephone, have received less attention. Unfortunately, the telephone sprang into general use at a time when societies were prepared to accept new technologies without doubts and questions; so there seem to have been no "technology assessors" around to expose the effects of the telephone age on social behaviour.

In retrospect, we can hypothesize that the telephone permitted Canadians to spread out thinner - much in the way that the automobile permitted urban sprawl. If, as Pye proposes, the mass media contribute to the growth of trust in institutions, to a group identity, perhaps the telephone does too, at a more personal level. Can the aura of the communication process normally conjured in face-to-face interaction (it is said that business men like to be able to smell one another) be extended in space by the telephone and other two-way devices?

Of course, it would be difficult to measure such effects, even if they exist. One of the advantages of a multivariate


RB
CL
IG
CD
FB
SL
- - - the transportation-telecommunication axis

MAP 2

CANADA: THE TRANSPORTATION - TELECOMMUNICATION AXIS

75

approach is that each variable can be considered not only a measure of some quantity (number of students) but also an indicator of some less concrete social tendency (desire for education). This approach is highly speculative, especially when applied to the limited sample available here. However, it is hoped that this exploratory effort will contribute to the sparse literature on the relationship of telephony and other modes of communication to social and economic behaviour.

DESIGN

Obviously, we cannot perform an experiment here, for we cannot control independent variables to see what happens. We can only look back at what has happened, and try to isolate variables via processes of selection, rather than manipulation. Consequently, we have chosen to examine a set of six sites representing different stages in telecommunications development. Five of the sites are in the Eastern Arctic; the sixth, Sioux Lookout in Northwestern Ontario, serves as a "control community". Sioux Lookout is comparable to Frobisher Bay in that it is a "northern" community of roughly 2,500 people, and is a centre of supply and administration for a more remote hinterland. However, Sioux Lookout has been a part of the national road, rail and broadcasting networks throughout the very period in which Frobisher Bay has seen the development of air travel and telecommunication from scratch. With respect to communication services, Sioux Lookout and Frobisher Bay currently lie at about the same level, while the other four communities are stretched along a "continuum" which approaches zero-level service (see Map 2 and Diagram 2.1).

For each site, time-series data has been collected for a large set of variables (see Appendix A). Generally, the objective was to select measurable indices of social, economic and substitutional behaviour which would have some bearing on theoretical issues. The period covered - 1960 to 1973 - encompasses the significant changes in telecommunication service. As Diagram 2.1 shows, the design permit comparisons along two axes. On one axis, the six communities can be compared latitudinally at

——— LEVEL OF TELECOMMUNICATIONS SERVICE ———→

↑ TIME

	CL	CD	IG	RB*	FB	SL
1974	.	.	Ntel	Ntel	.	.
1973	.	.	.	.	NtelNtvNr	.
1972	.	.	.	.	.	.
1971	.	.	.	.	tv	.
1970	.	.	.	.	.	.
1969	.	.	.	.	.	.
1968	.	.	.	.	.	.
1967	.	.	.	.	.	.
1966	.	.	.	.	.	.
1965	.	exc	exc	exc	exc	ddd
1964	.	.	.	.	.	.
1963	.	.	.	.	.	.
1962	.	.	.	.	.	.
1961	.	.	.	.	r	.
....	hf	hf	hf	hf	t	NtelNtvNr

Diagram 2.1 A graphical plan of the study. Comparisons can be made along the two dimensions shown: time,with comparisons within each community; and level of telecommunications service,with comparisons between communities with different services.

KEY:

CL=Clyde River
CD=Cape Dorset
IG=Igloolik
RB=Resolute Bay*
FB=Frobisher Bay
SL=Sioux Lookout

hf=HF radiophone
t=telephone exchange,long distance (LD) via troposcatter
exc=dial exchange, LD via HF radio
ddd=direct distance dialing
Ntel=network quality telephone
Ntv =network quality television
tv= television via tape
Nr =network quality radio
r= AM radio

*Dropped from analyses due to lack of data.

any point in time in the period under study. On the other axis, any community can be examined longitudinally at several points in time.

Interviews were also conducted. In each community, native fieldworkers capable of interviewing in either English or Inutitut were hired. Their job was to select households at random in their own community, and interview an adult, teenager and child (less than 13 years old) where possible in each of these households. Since the interviewers were not specifically trained for the job and had to work with minimal supervision, interview protocols (in the form of booklets; see Appendix B) and item-by-item instructions were prepared for their use.

According to plan, the interviews would have provided additional latitudinal data on attitudes towards communication services. This type of information might reveal differences in perceptions and behaviour among those enjoying different levels of communication service. However, this type of data was obtained in only 4 of the 6 communities, and so has not been treated in depth in this report.

Although all communication services are of interest in this study, time-series data is not available for television and radio. In fact, usage of these media is hard to gauge even in the present - number of receivers sold, number of viewing hours and so on, give only a rough estimate of usage. What is required is an in-depth study, perhaps through interview and diary approaches, of who attends to what in the broadcast media. Furthermore, only two of the six communities have appreciable broadcast services.

On the other hand, telephone data is (at least in this instance) available, for not only the number of units rented but also the rate of use (for outgoing long-distance calls) can be obtained in fairly "hard" numbers from the study's sponsor, Bell Canada. Interview data can be used to supplement the cold figures.

For these several reasons, we concentrated upon the telephone sector in this study.

PRACTICAL PROBLEMS

In the Second Report on Progress, problems encountered and

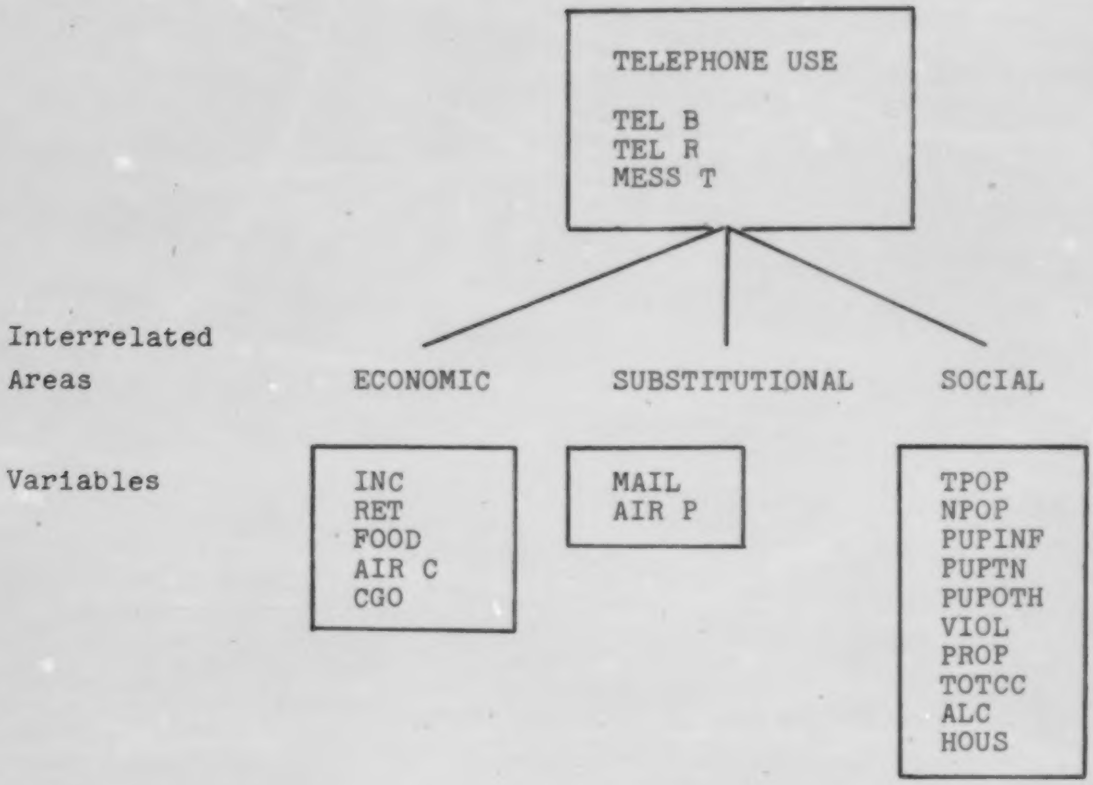

TELEPHONE USE
TEL B
TEL R
MESS T
Interrelated Areas
ECONOMIC
SUBSTITUTIONAL
SOCIAL
Variables
INC
RET
FOOD
AIR C
CGO
MAIL
AIR P
TPOP
NPOP
PUPINF
PUPTN
PUPOTH
VIOL
PROP
TOTCC
ALC
HOUS

Diagram 2.2 The model for the telephone sector. Three areas of potential interrelation are being examined. Under each area is a list of relevant variables,for which time-series data has been obtained. Explanation of the variables can be found in Appendix A.

anticipated in gathering data were discussed. Generally, numerical records are non-existent, inaccessible, incomplete, or just hard to find; and the collection of first-hand information via interviews is fraught with problems. In the following pages, the ailments and attempted remedies are reviewed.

TIME-SERIES DATA

Appendix A presents the list of 42 variables for which a reasonable number of values could be obtained in roughly 9 man-months. These man-months were largely consumed in writing, telephoning and visiting sources of unpublished data (responses to queries made as early as May 1974 were still arriving 7 months later). Many of our respondents seem to have expended considerable effort in retrieving and organising data; in some cases, the end product was ready for computer-coding when it arrived. Nonetheless, approximately 6 man-months were consumed in sorting data and performing basic manipulations so that relevent values would be available for plotting and analysis. For example, several sets of annual population figures were obtained for the Arctic Communities. Decisions and adjustments had to be made to settle on a single set. On the other hand, only 3 census figures, for 1961, 1965, and 1971, were available for Sioux Lookout; so interpolations and extrapolations were made to derive annual figures.

Irregular data is the main penalty incurred in moving from vague quantities (e.g., GNP, regional figures) to the more specific (e.g., sample outputs of local industries, traffic between two points). Generally, published figures are not useful, since statistical services are usually required to aggregate data to disguise sources. The alternative is to seek information directly from the commercial and governmental organisations involved. Since their ends and means vary greatly, it is not surprising that their records are not uniform: formats change, data may be kept for but a few years, if at all. Of course, the problem of continuity is particularly acute in time-series studies.

A close scrutiny of Appendix A would reveal that the record of food and retail sales is fairly complete; that the record for fur sales is complete for Arctic communities, but there is no record for a similar contributor to the economy in Sioux Lookout; that the record for all education variables is fairly complete. For the transportation crime and mail variables, data is moderately good (note that commercial air service and, hence, probably mail service, did not reach the smaller Arctic sites until about 1969; and at Sioux Lookout, goods and passengers move by car, truck and train, rather than by airplane). While the record of telephones installed is almost complete, data on telephone traffic is only available for the last 3 years of the period under study.

As a result of the numerous irregularities, only some of the 42 variables have been used. The first 24 variables in Appendix A are treated in detail via "graphical analysis" in Chapter 3, Sections 1 to 6. Little data on this set of variables could be obtained from Resolute Bay. Consequently, this community was dropped from the analysis.

Although rigorous statistical analysis of the numerical data would be desirable, it is not feasible because of the small sample size. Since each community represents a different level of the salient factor "telecommunications development", the sample size at each level is "1".

INTERVIEWS

The success or failure of the interviews largely depended upon the diligence of the locally-hired interviewers. In Igloolik Clyde River, and Cape Dorset, the interviewers performed well, completing 50, 28, and 15 interviews respectively. For the first two communities the sample-sizes (about 65% of all households) met our objectives; only about 20% of households were sampled in Cape Dorset.

Unfortunately, no returns at all were received from Frobisher and Resolute Bays. In the latter case, this is of little consequence, since time-series data for Resolute was so sparse that this site was dropped from the analysis. However, the failure in Frobisher Bay is a major blow to the study, at least in the short run - in the long run, this gap may be filled with comparable data from studies being conducted at Concordia University, Montreal. With hindsight, we see that it was unwise to expect our fieldworkers in Frobisher to complete this task without daily supervision. Even occasional visits by two of the research assistants were not sufficient to spur the interviewers; and when it finally became clear that no interviewing was being done, there was little time left for remedy. The cost of providing daily supervision would have trebled the cost of interviewing in Frobisher, in time and money, but that seems to be the only way of guaranteeing results. As we have since learned, others have encountered the same problem in Frobisher Bay - which, it seems, suffers rather frequent surveys. It is perhaps significant for the study of behavioural change in the Arctic that this failure occurred at the sites experiencing intense cross-cultural contact, and not at the outlying communities.

Finally, interviewing at Sioux Lookout was effected via a cooperative agreement with the QUIST Group at Queen's University. This Group conducted thorough field studies in Sioux Lookout to obtain basic data for a "community model". Behaviour related to communication services is, of course, part of the system that they are piecing together; consequently, the Group supervised interviews of mutual interest. Although 60 interviews were conducted, the results are not dealt with here because of the lack of a comparable sample from Frobisher Bay.

In view of these problems, the interview data is treated rather briefly, in a non-statistical fashion, in Chapter 3, Section 7. Cross-tabulation is the main analytical tool used on this data.

CHAPTER 3

ANALYSIS OF THE DATA

PROLOGUE

In lieu of rigorous statistical testing, a comparative analysis of numerical data has been effected simply by graphing variables as a function of time (see CAMPBELL and STANLEY, 1966). In order to reduce variation among sites due to differences in population, all data has been transformed to a "per thousand people" value. Secondly, to obscure absolute values and to permit comparison of very different figures (such as "numbers of air passengers" and "retail sales in dollars"), all data has been related to a base-line of 1.00 at 1971. That is, for each variable the value per thousand population for 1971 has been equated to 1.00; and then the values per thousand population for other years have been plotted as relative differences from the 1971 value. This is merely a change of scale, and has no effect upon the shape of the time-series functions.

In the first five sections of this chapter, plots of the time-series data for each community are presented. Here, the discussion focuses upon the degree to which change in a given variable coincides with change in another variable or variables. The objective is to identify relationships among the social, economic and communications variables under study.

The discussion is not expected to be the last word on the subject. Intuition has played a large part in the selection of sets of variables to be compared. Wherever possible, reasons for interrelating specific variables are given, and alternative variables are displayed for the reader's convenience. Of course, the reader may develop hypotheses of his own; it is hoped that the graphs will help the reader test his hypotheses.

In the sixth section, time-series data for all five communities are plotted on the same graph, one variable at a time. Here the objective is to compare changes in socio-economic and communications variables across the five communities.

Finally, the seventh section of this chapter contains a brief summary of the interview data which is most relevant to the issues discussed in the rest of the chapter.

Notes to help the reader interpret the graphs precede the first and sixth groups of graphs, at the end of the respective sections. A list of variables and symbols used on the graphs precedes each group.

Since no major changes in telephone tariffs have occurred in the period under study, the price factor is not considered in examining changes in telephone usage. It is assumed that changes in prices of other goods and services - food, dry goods, air travel, and so on - essentially follow the inflationary trends indicated by the shrinking value of the 1961 dollar.

SECTION 1: SIOUX LOOKOUT

Despite many similarities between Sioux Lookout as a "northern town" and the Arctic communities, there are some basic differences. First, Sioux Lookout falls under the jurisdiction of the Ontario government, rather than the Federal and Territorial counterparts; as a result methods of compiling data differ from those in the Arctic. Secondly, Sioux Lookout is served by the railroad and paved highways, so most movements of people and goods go unrecorded. Thirdly, Sioux Lookout stands on a different economic base (forestry, tourism) than the Arctic communities. All this means that a number of variables which are very important in the Arctic - annual population, air travel, air cargo, fur purchases - have no counterparts in Sioux Lookout.

The time-series data obtained on Sioux Lookout is reported in Graphs 3.1.1 to 3.1.8. Note that the total population of this community remains at a fairly constant level over the period studied. This can be attributed to two facts: one, Sioux Lookout is an incorporated town, so that census figures report only the population within its fixed boundaries, and do not reflect suburban growth; two, increments which might be expected through births and new arrivals have perhaps been offset by departures following the phasing out of major CNR operations in the late sixties. In this case, the population graphs are based on only 3 census figures (1961, 1965, 1971). However, the figures for total number of pupils (Graph 3.1.6) tend to confirm that the population of Sioux Lookout remains quite stable over the period under study.

Food and retail (dry goods) sales show substantial increases relative to 1971 values (Graphs 3.1.3. and 3.1.4). Since the population of Sioux Lookout itself remains quite stable, the increases might be attributed to one or more of the following factors: first, the same number of people are buying more per capita; second, the sample food and retail outlets are capturing an increasing proportion of their potential markets; third, the suburban population is increasingly contributing to the sales figures.

In this area, the ratio of urban to suburban population is roughly 3 to 1; therefore it seems unlikely that increases in the suburban population alone can account for the observed growth in sales. Let us further assume that our sales samples are in fact representative, as there is no evidence to the contrary. We can then attribute observed growth primarily to the first factor, namely an increase in per capita consumption.

In Graph 3.1.3 we see that the number of telephones installed per 1,000 people is stable until a year after the conversion from operator- to dial-exchange in late 1965; from that point the pace of installation accelerates. Note that a breakdown of telephone installations into business and residential categories is not available for the years prior to 1968. However, the data for 1968-73 shows that the business and residential trends do not differ greatly from one another in this community; hence total installations seem to adequately represent both sub-categories.

Comparing growth rates for total telephones installed with growth rates for food and retail sales we see that there is little evidence of parallel trends (Graphs 3.1.3 and 3.1.4). The trends for food and retail sales begin to accelerate in 1970, long after telephone installations do so; however, acceleration is then much more rapid than in the telephone figures.

Graph 3.1.5 illustrates the spectacular growth in crime after 1970. Although increase in crime is often associated with economic factors, such as the inflationary pressures beginning around 1971, the increase in the levels of crimes of violence and total criminal code offences is considerably greater than the increase in property crime. In 1973 the number of violent crimes is roughly 1.5 times the number of property crimes; and the total number of offences is roughly 5 times the sum of these two.

Graph 3.1.6 displays the trends for total pupils and female pupils. Generally, there is little change except for an abrupt rise in 1965, and an abrupt drop in 1971. These might be due to influxes of students from outlying areas and/or administrative shifts in school boundaries.

In Graph 3.1.7 a number of communication variables are plotted. In this community, where mail and telephone are established services, the trends are remarkably similar. One might expect usage of these services to approach asymptotic levels in a "mature" community. As Table 3.6.1 shows (see Section 6), the levels of mail volume and telephone subscription in 1973 are very high relative to the Arctic communities. Trend lines (Graph 3.1.8) indicate that telephone usage has reached asymptotic levels in Sioux Lookout.

In 1973, residential subscriptions per 1000 people in Sioux Lookout are considerably above the value for all Ontario (roughly 402), and business subscriptions are slightly below the all-Ontario figure (roughly 246). Ontario figures are derived from telecommunications data published annually by Statistics Canada.

NOTES ON THE GRAPHS - SECTIONS 1 TO 5

The graphs in each of the first five sections of this chapter have been prepared under the following conventions:

(1) Each group of graphs presents sets of variables for one of the five communities.

(2) The first graph in each group presents raw data on population, in thousands.

(3) Subsequent graphs in each group present data calculated as a ratio of the 1971 value for each variable (i.e. the 1971 value = 1.00).

(4) All variables except populations and average family income (INC) are standardised by dividing the raw value for each year by the appropriate population in thousands for that year.

(5) Where several functions follow the same path, only one line is shown.

(6) In the initial presentation of dollar values, both actual and constant (1961) dollars are shown. For the most part, these two functions follow parallel paths.

KEY

VARIABLES

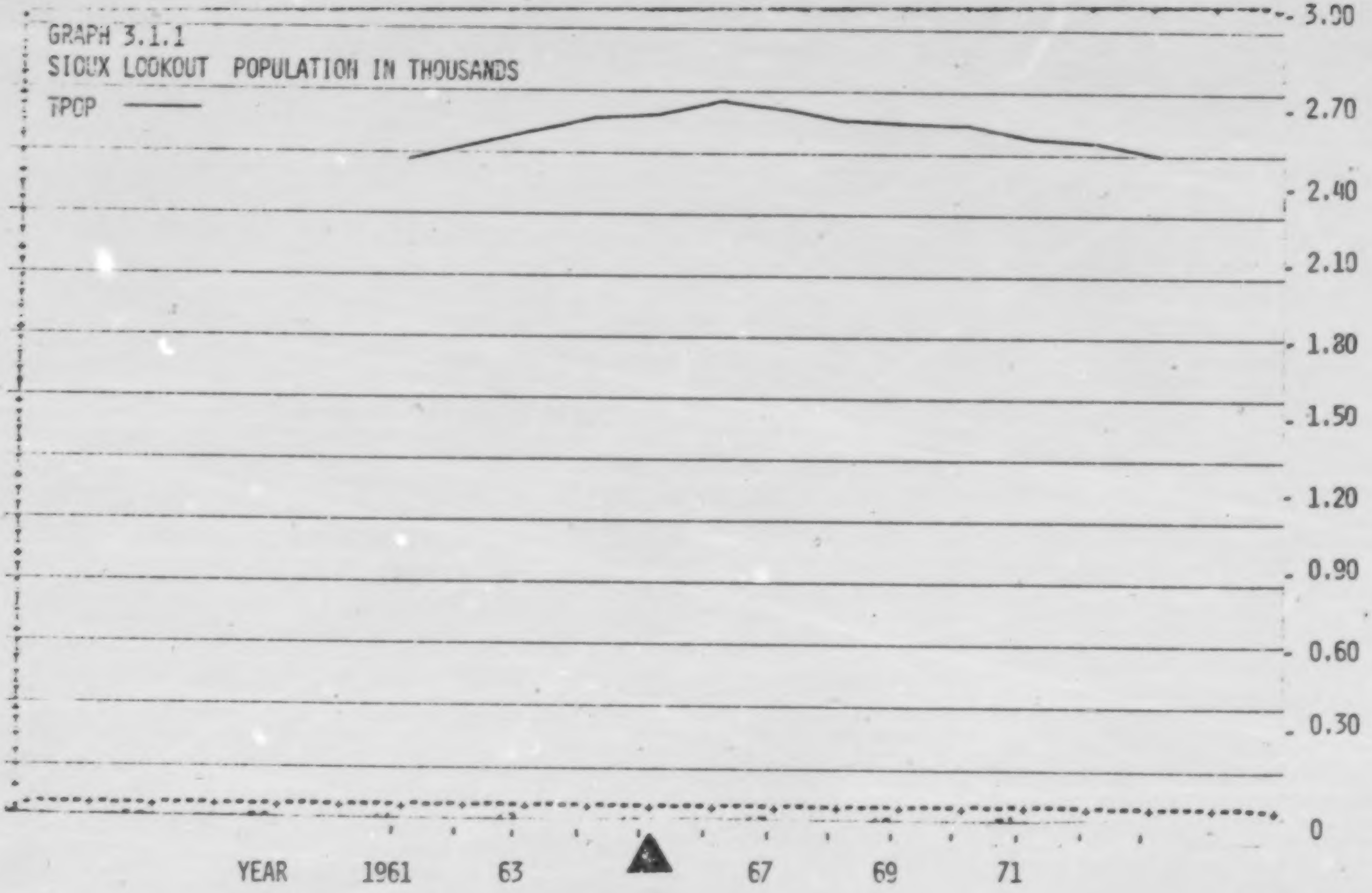
AIR C	Air cargo
AIR P	Air passengers
CGO	Sea cargo
FOOD	Food sales
FUR	Fur purchases
INC	Average family income
MAIL	Mail volume
MESS S	LD telephone calls into national network
MESS T	D telephone calls, total
MIN S	Duration of LD calls into nat. network
MIN T	Duration of LD calls, total
N POP	Native population
NN POP	Non-native population
PROP	Property crime
PUPINF	Pupils, native female
PUPF	Pupils, female (SL)
PUPOTH	Pupils, non-native
PUPT	Pupils, total (SL)
PUPTN	Pupils, total native
RET	Retail sales
TEL B	Business telephones
TEL R	Residential telephones
TEL T	Total telephones (SL)
TOT CC	Total criminal offences
TPOP	Total population
VIOL	Violent crime

SYMBOLS

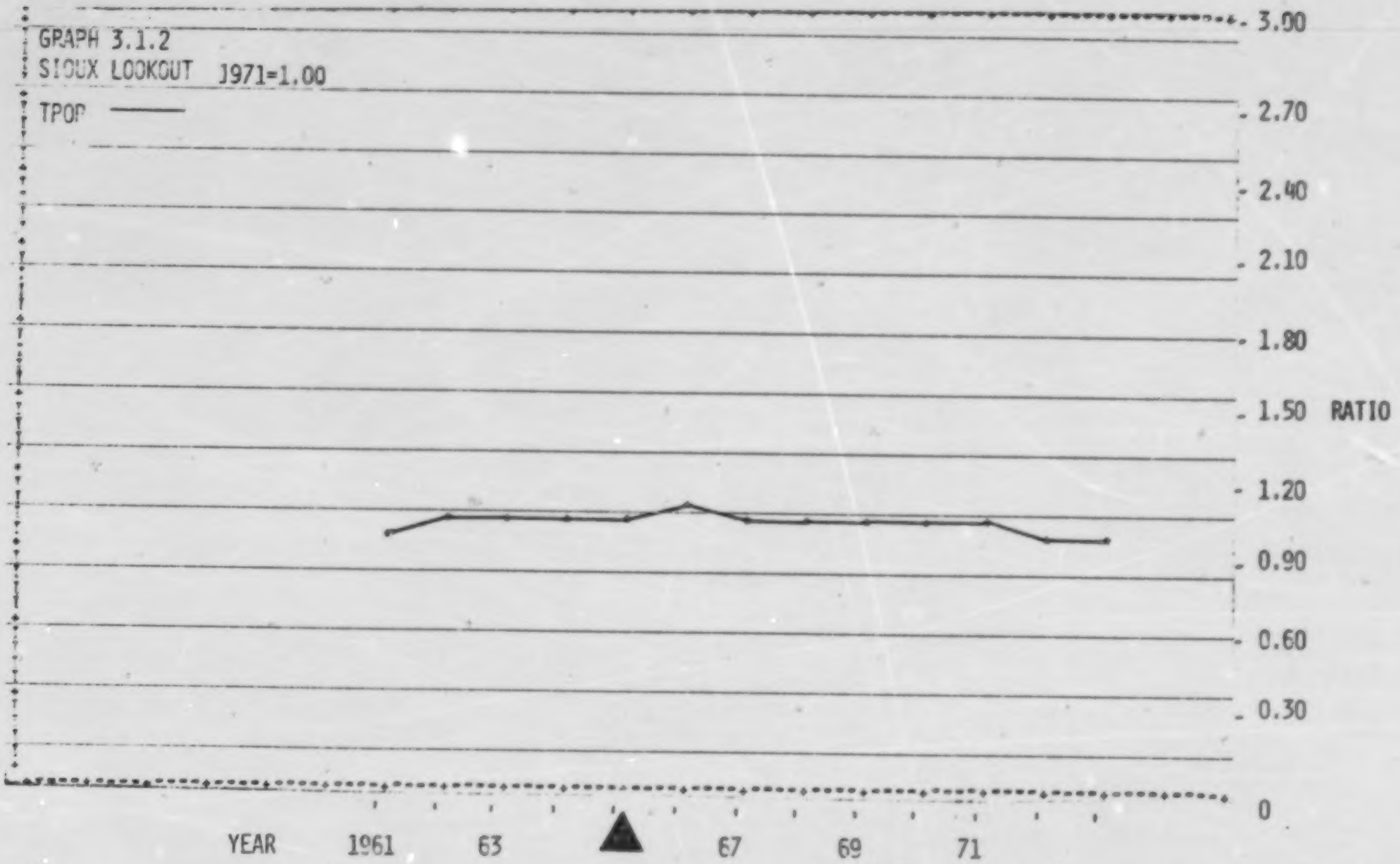
▲ Start of dial telephone service, following upgrading of old exchange, or new installation.

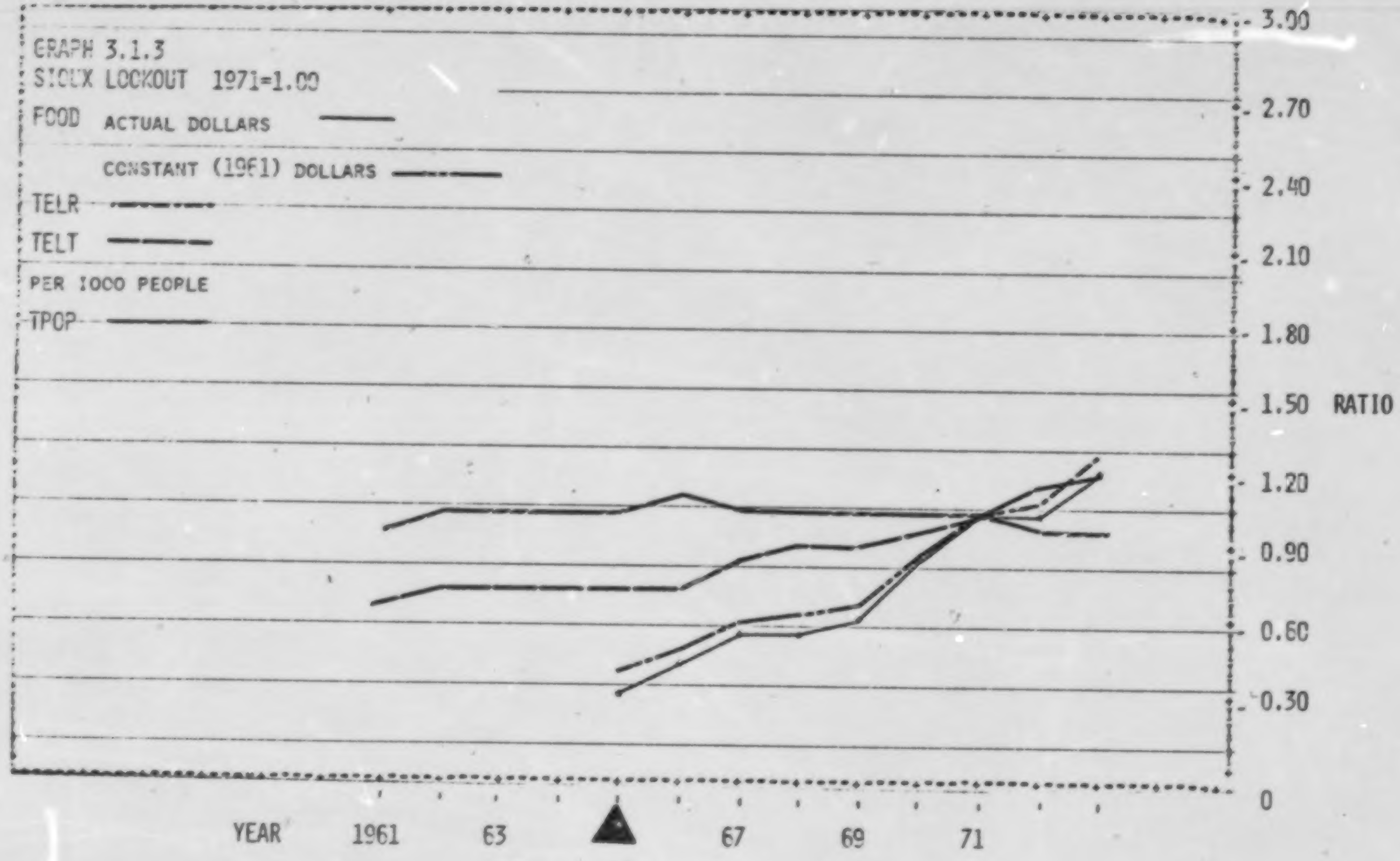
⌂ Start of Federal Rental Housing Program.

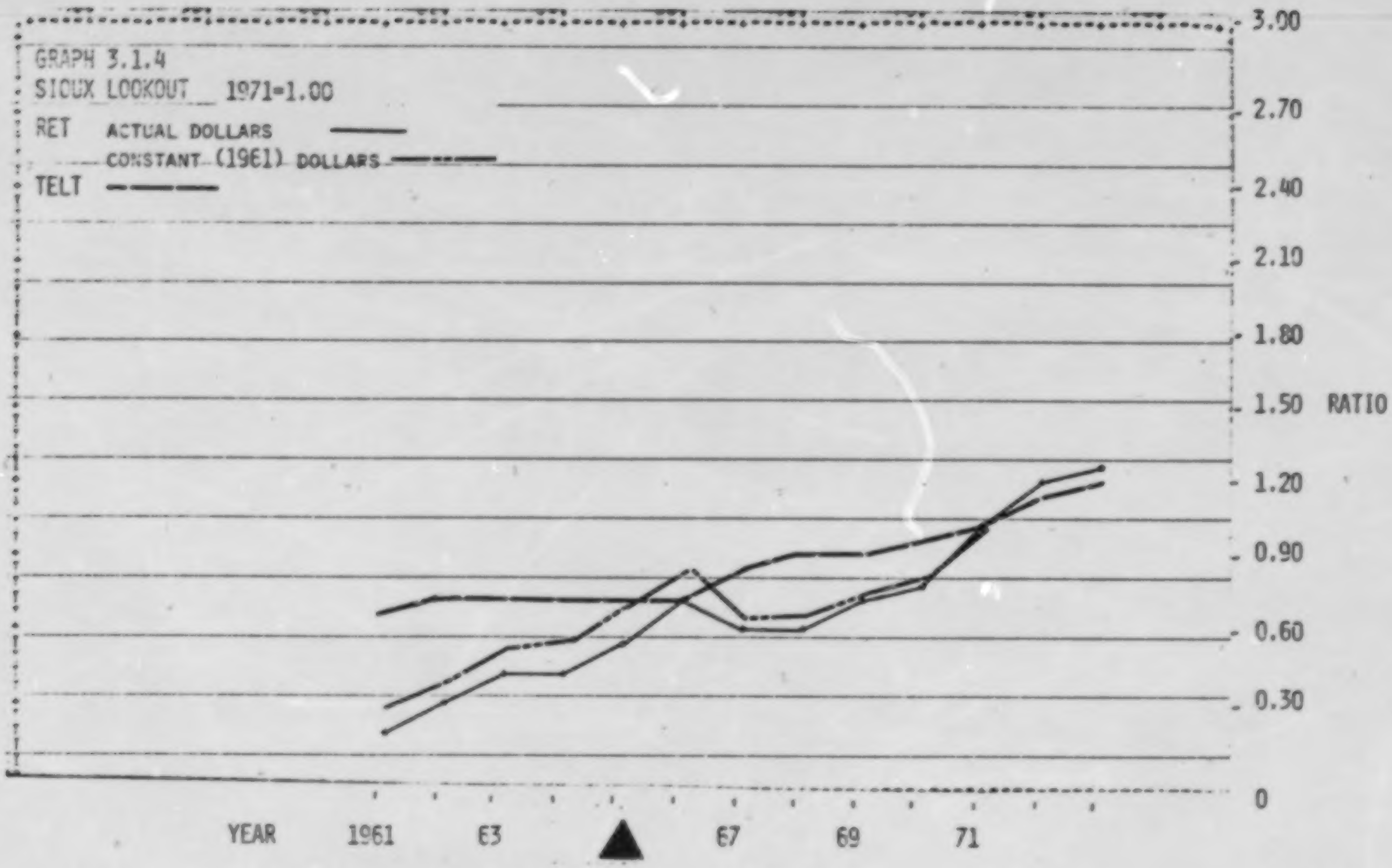
★ Start of satellite communications service via Anik.

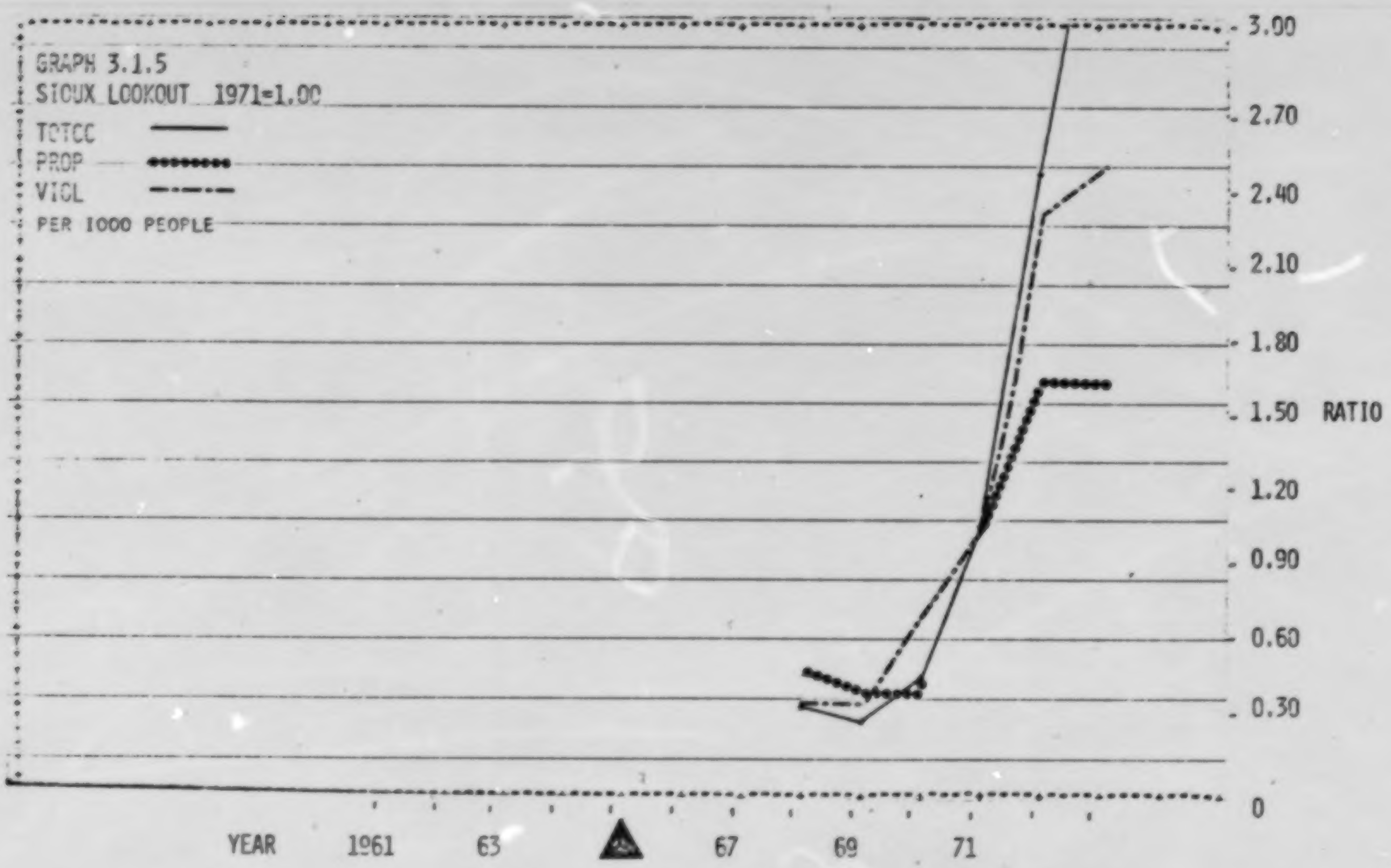


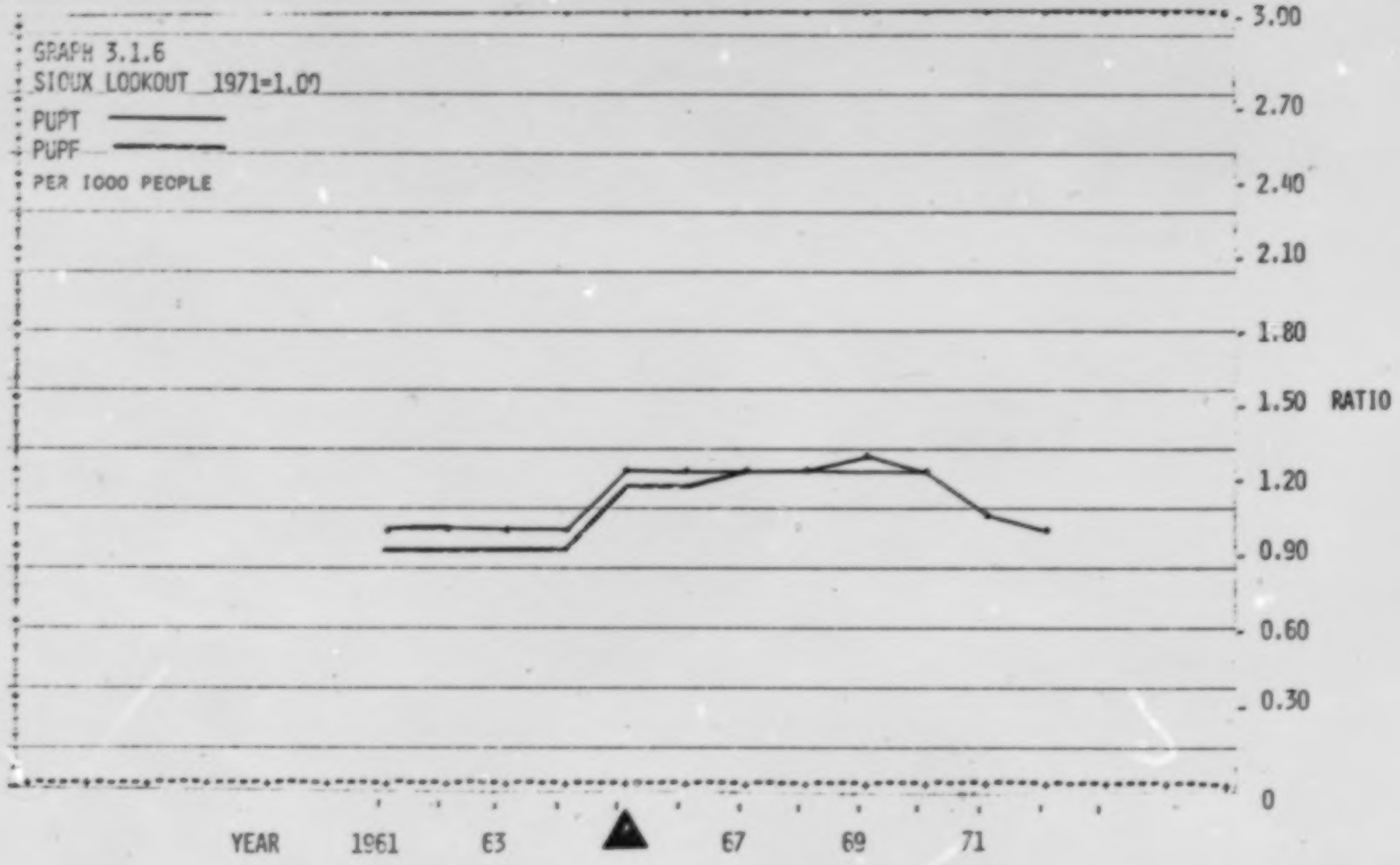
GRAPH 3.1.1
SIOUX LOOKOUT POPULATION IN THOUSANDS

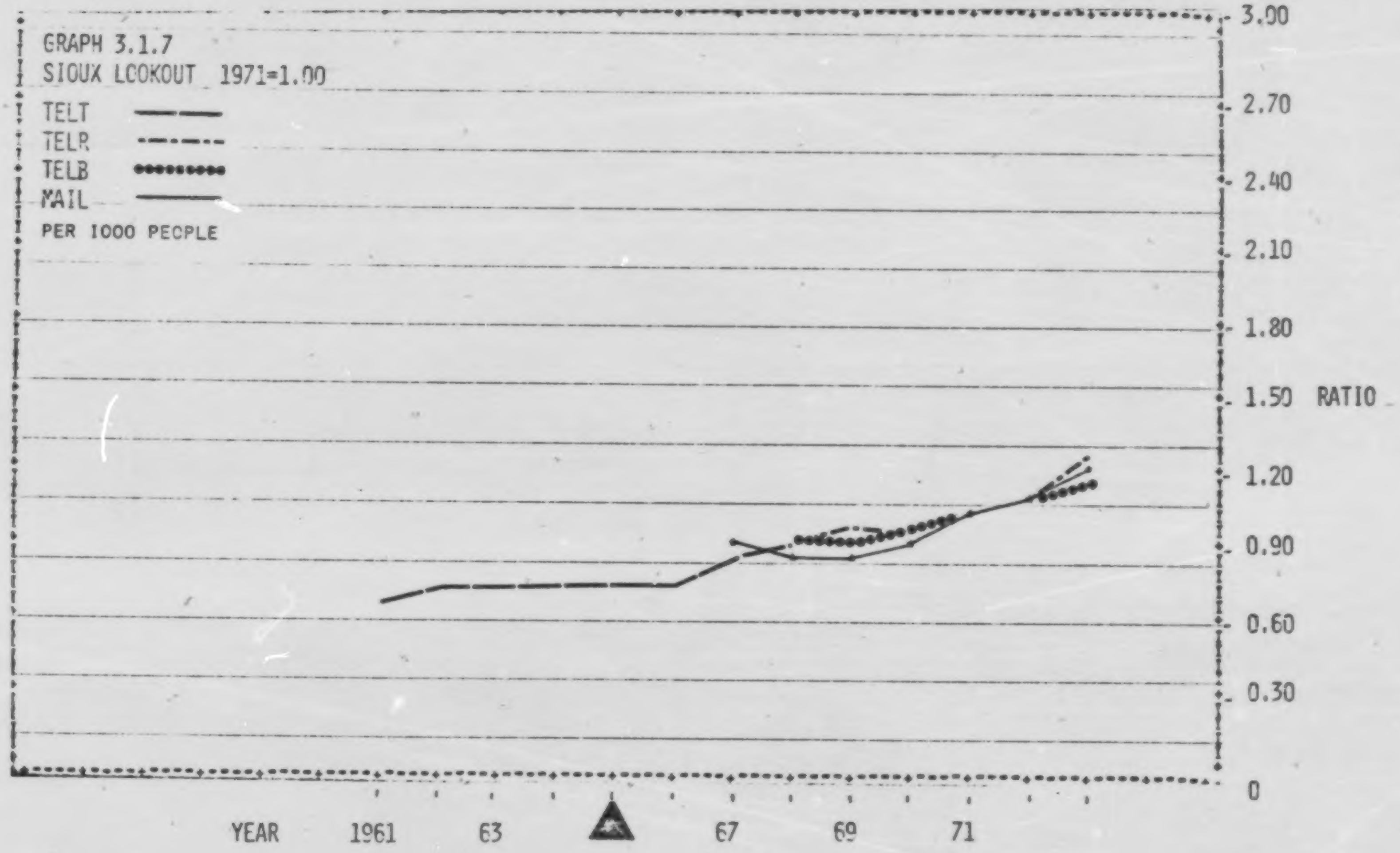

GRAPH 3.1.2
SIOUX LOOKOUT 1971=1.00
TPOP
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71

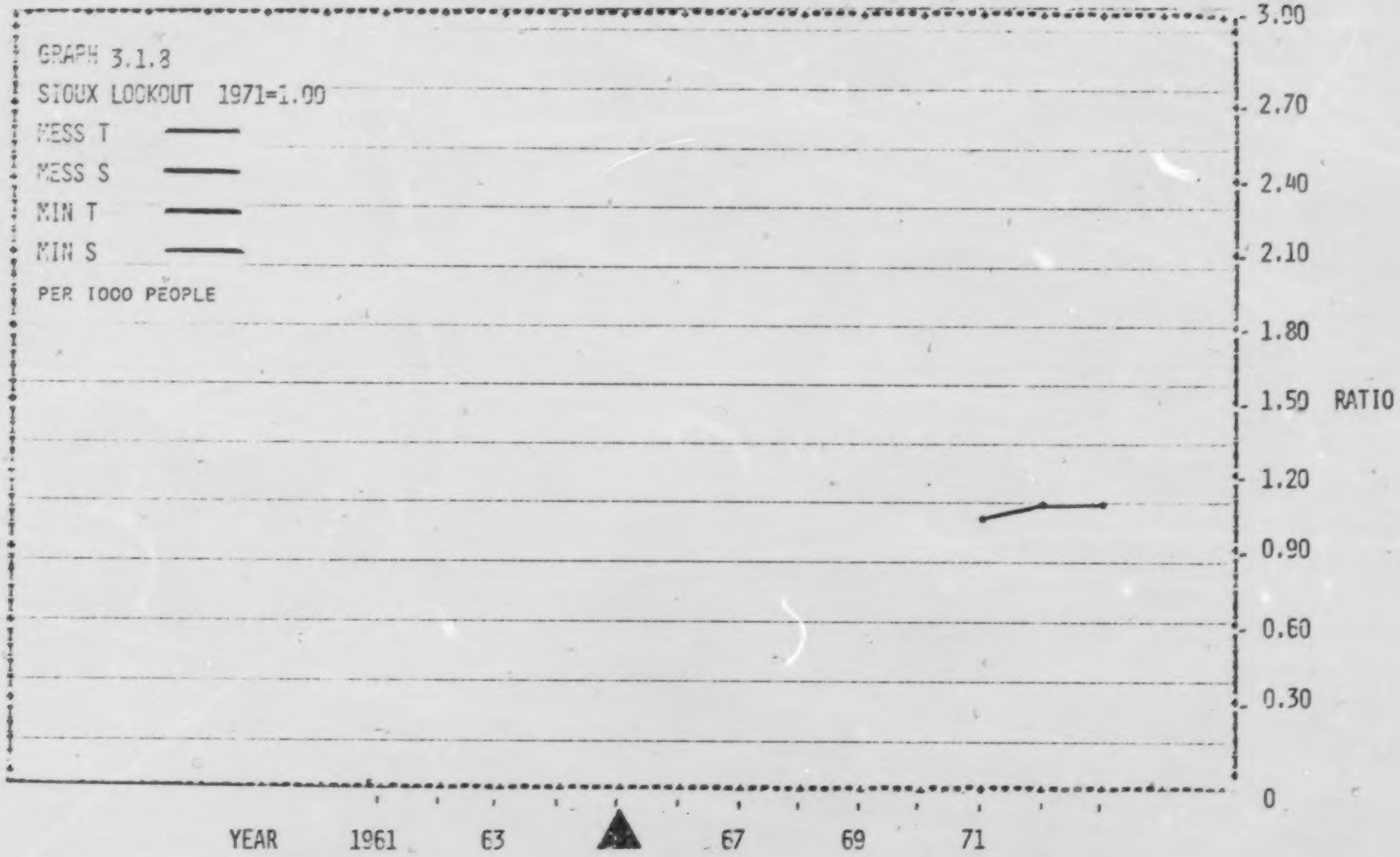

GRAPH 3.1.3
SIOUX LOOKOUT 1971=1.00
FOOD ACTUAL DOLLARS
CONSTANT (1961) DOLLARS
TELR
TELT
PER 1000 PEOPLE
TPOP
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.1.4
SICUX LOOKOUT 1971=1.00
RET ACTUAL DOLLARS
CONSTANT (1961) DOLLARS
TELT
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.1.5
SIOUX LOOKOUT 1971=1.00
TOTCC
PROP
VIOL
PER 1000 PEOPLE
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.1.6
SIOUX LOOKOUT 1971=1.00
PUPT
PUPF
PER 1000 PEOPLE
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.1.7
SIOUX LOOKOUT 1971=1.00
TELT
TELR
TELB
MAIL
PER 1000 PEOPLE
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.1.8
SIOUX LOOKOUT 1971=1.00
MESS T
MESS S
MIN T
MIN S
PER 1000 PEOPLE
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71

SECTION 2: FROBISHER BAY

Time-series data obtained on Frobisher Bay are displayed in Graphs 3.2.1 to 3.2.10. Graph 3.2.1 gives the raw figures for total population, native population and non-native population. In this case, about 30 to 40% of the population is non-native. Total population shows a moderate rate of increase, accelerating in 1970 (Graph 3.2.2). It would seem that this acceleration could be attributed to an influx of non-natives, since the ratio of native to total population drops abruptly at the same time. This apparent influx coincides with the growth of the regional government headquarters in Frobisher.

In all the Arctic communities, population figures are available for each year; and they accurately reflect the total population in the area, since there are no "suburban" or "rural" inhabitants. Even in the years before the native population began to congregate in communities population figures covered whole regions rather than single villages.

In Graphs 3.2.3 and 3.2.4 we see that sales of both food and dry goods (retail sales) show similar trends: rapid increase after 1965, falling abruptly in 1971. Note that since all values are "per 1,000 people" change cannot be attributed to variations in population. However, the drop from 1970 levels does coincide with a change in the nature of the total population; it is conceivable that the non-native newcomers bring new buying habits with them (e.g. ordering from outside). It is also conceivable that the sample sales outlets lose part of their 1970 share of the market in 1971.

It seems unlikely that either of the latter two explanations can account for the changes observed, for there are parallel changes in other variables, especially in the number of residential telephones installed (Graph 3.2.3). For the most part, inflections in the trend for residential telephones closely follow inflections in the food sales trend. These two variables are perhaps good indications of the level of disposable income.

In the case of business telephone installations per 1,000 people, growth is stable from 1967 to 1970, on a slope parallel to that for retail sales (Graph 3.2.4). However, the trend for business telephones levels off at the 1970 peak, and does not show the abrupt drop which residential telephones and sales show in 1971.

Other variables which show a similar peak in 1970 followed by an abrupt drop are air cargo (Graph 3.2.8), air passengers (Graph 3.2.9) and crime levels (Graph 3.2.7). Since there is a broad spectrum of variables following the same trend, it seems reasonable to attribute the sudden changes to changes in the economic climate prevailing at Frobisher - and more specifically, to "boom" conditions surrounding the growth of the regional government headquarters at Frobisher. As we shall see later, this "boom" phenomenon is not evident at any of the other sites under study.

Graph 3.2.5 displays the erratic changes in fur purchases in Frobisher. Pelts formed the basis of the "traditional" economy in the Arctic, an economy subject to vagaries in the demand for fur in distant cities. A brief rise in the price paid for seal in the early sixties was followed by collapse of the market in 1964. As income from trapping fell, we can presume that natives turned to other sources, for average family income and retail sales (for example) begin to rise just as the fur market collapses (Graph 3.2.5). The need to enter the wage-welfare economy was an important factor contributing to the rapid "urbanisation" of the Eastern Arctic at the start of the rental housing program in 1965.

Graph 3.2.6 deals with all the data available on crime since the establishment of R.C.M.P. detachments in the settlements. The similarity in shape to the trends for sales, telephone, and travel variables has already been noted. It is unlikely that the rapid increase in crime can be wholly attributed to improvements in detection, for the trend is similar in all communities, and even more pronounced in Sioux Lookout which is under the jurisdiction of a different police force. In 1973 the levels of violent and property crime per 1,000 people in Frobisher Bay are 1.3 and 1.8 times the respective levels in Sioux Lookout. However, total criminal code offences reach only .4 of the level in Sioux Lookout.

If the 1970 peak in sales and other variables can be attributed to economic factors, so might the 1970 peak in crime. To pursue this hypothesis, let us think of "fur purchases" as an indication of the strength of the "traditional economy". Mapping fur purchases on top of crime levels, year by year, we see that there is a suggestion that peaks in the level of crime coincide with troughs in the traditional economy - at least in the little data at hand (Graph 3.2.6). Here perhaps is evidence of the socially disruptive effect of gross economic change.

Another adjunct of sudden economic change is a more generalised conflict of cultures - in this case the clash of nomadic hunters with the industrialised wage-earner. We can advance this type of conflict as a second hypothesis to explain the rapid increase in crime (a hypothesis which would only be viable in the case of Sioux Lookout if much of the crime is committed by the very small native community there). Let us look upon the number of non-native pupils as an indication of the degree of cultural juxtaposition. This is not unreasonable, for the number of non-native pupils undoubtedly reflects the degree to which the schools and other services meet the cultural standards of the parents who choose to venture north with their children. Mapping non-native pupils onto crime levels, we find no parallels; in Frobisher, this hypothesis is not supported by the evidence available.

Variables in the education sector are shown in Graph 3.2.7. The number of native pupils increases substantially after 1965; and the proportion of native pupils who are female remains constant throughout. Generally, the fraction of the total population which is in school increases between 1965 and 1971 (since the number of native pupils grows at a faster rate than total population); this fact not only reflects a certain degree of acculturation, but suggests that the rate of acculturation will be accelerated in the future.

Graph 3.2.8 reports on air and sea cargo. Much of the data for sea cargo is off the top of the graph (between 4.0 and 6.0); there is a drastic fall in sea cargo to the 1971 value. At this point, air cargo has reached a relatively high point. The values at any point in time cannot be compared, since sea cargo data is based on a sample drawn from a population of shippers, whereas air cargo data is drawn from the major licensed carrier.

Finally, we get down to analysis of the communication sector in Graphs 3.2.9 and 3.2.10. The former presents variables for which data is available over a relatively long period - telephones installed, mail volume, and air passenger traffic. For the most part, the trends for residential telephones and mail volume are very similar. The level of residential phone installations begins to rise in 1968 - 3 years after dial telephones became available - after a slight decline from 1962. However, mail volume shows a precisely parallel rate of change, except between 1969-71; there is no evidence here that telephones are substituting for letters. In fairness, it must be noted that the number of telephones installed is not a sensitive measure of telephone usage. It would appear that both the number of telephones and the volume of mail are reaching saturation levels around 1971. The same may be true of air passenger traffic.

If the reader looks ahead to Table 3.6.1 in Section 6, he will note that the number of residential phones per 1,000 people in Frobisher is only about half the number per 1,000 people in Sioux Lookout. However, the number of business phones in Frobisher does approach the figure for Sioux Lookout. If there is indeed "saturation", it is in the level of business telephones. Unfortunately, there is no data comparable to air travel for

Sioux Lookout.

Looking at the sparse data available on telephone usage we find a sudden increase in traffic (Graph 3.2.10). Growth is moderate between 1971 and 1972, but traffic virtually doubles in 1973, following the introduction of satellite service. It seems obvious that this rapid change in traffic is due to a technology-based improvement in service. This contrasts with the flat trend seen in Sioux Lookout over this same period (compare Graph 3.1.8).

If we use the 1973 data, the number of long distance calls per 1,000 people in Sioux Lookout is 1.2 times the number in Frobisher Bay, suggesting that Frobisher, with Anik service, is approaching saturation (Table 3.6.1). However, if the 1974 data is used, the traffic in Sioux Lookout is 1.6 times the Frobisher value. Data for subsequent years may help to determine whether the 1974 value for Sioux Lookout is anomalous.

In 1974, 83% of all calls from Frobisher are directed into the national telephone network in the south; only 17% are directed to other Arctic communities (see Table 3.6.1). In 1974, all southbound calls would use Anik; of the 17% of calls going to other Arctic communities, about 8% are known to utilise Anik, less than 2% are known to utilise HF-radio. The routing of the remaining 7% of total calls is not known. However, the data suggests that a great majority of the long distance calls from Frobisher go to points accessible via Anik.

In 1972, immediately before the introduction of Anik, an even higher proportion of outgoing calls (95%) were directed southward. At that time, Frobisher was connected to the national network by the troposcatter system, which was of considerably better quality than the HF-radio connection to other Arctic communities.

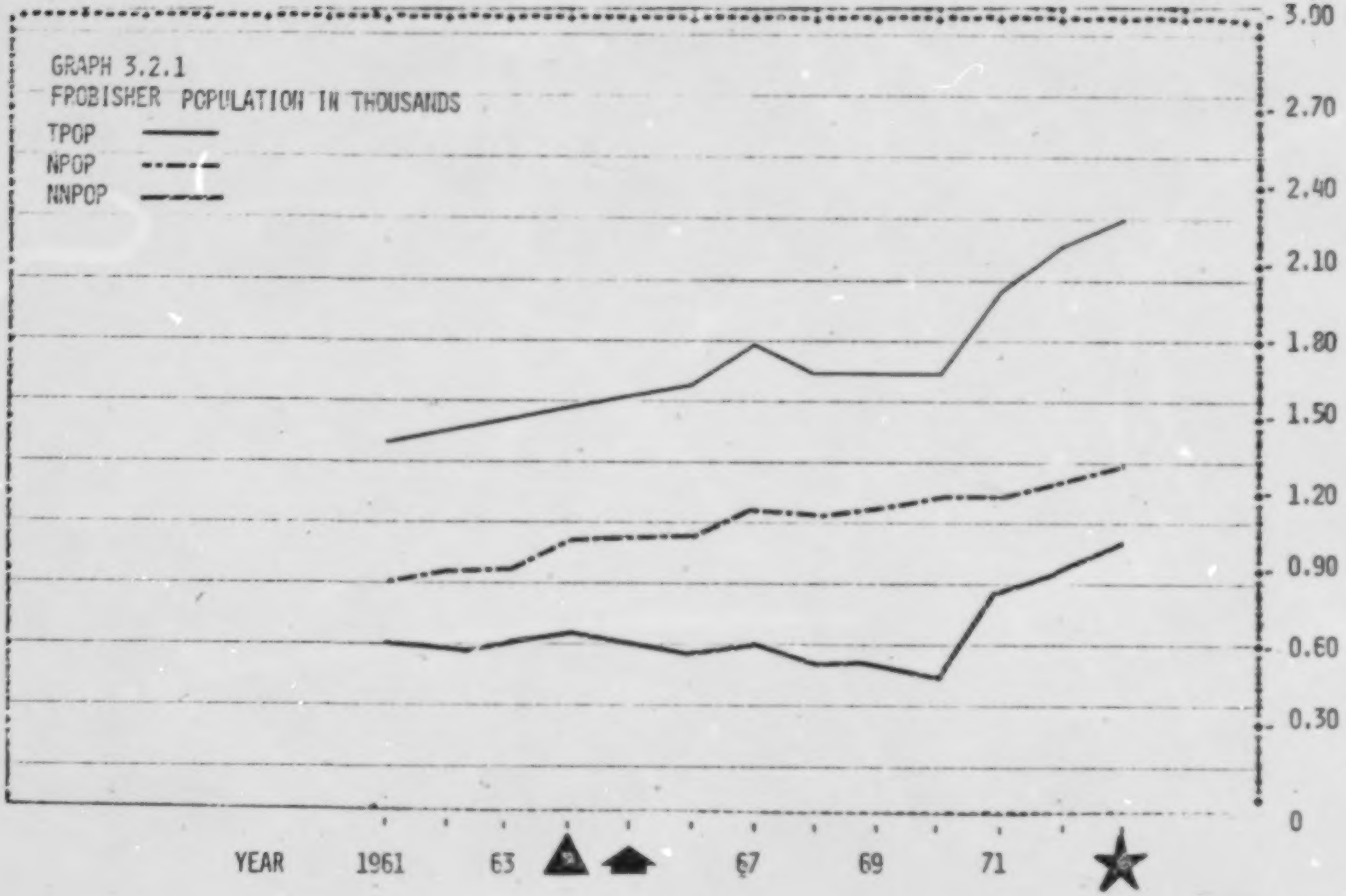
KEY

VARIABLES

AIR C	Air cargo
AIR P	Air passengers
CGO	Sea cargo
FOOD	Food sales
FUR	Fur purchases
INC	Average family income
MAIL	Mail volume
MESS S	LD telephone calls into national network
MESS T	D telephone calls, total
MIN S	Duration of LD calls into nat. network
MIN T	Duration of LD calls, total
N POP	Native population
NN POP	Non-native population
PROP	Property crime
PUPINF	Pupils, native female
PUPF	Pupils, female (SL)
PUPOTH	Pupils, non-native
PUPT	Pupils, total (SL)
PUPTN	Pupils, total native
RET	Retail sales
TEL B	Business telephones
TEL R	Residential telephones
TEL T	Total telephones (SL)
TOT CC	Total criminal offences
TPOP	Total population
VIOL	Violent crime

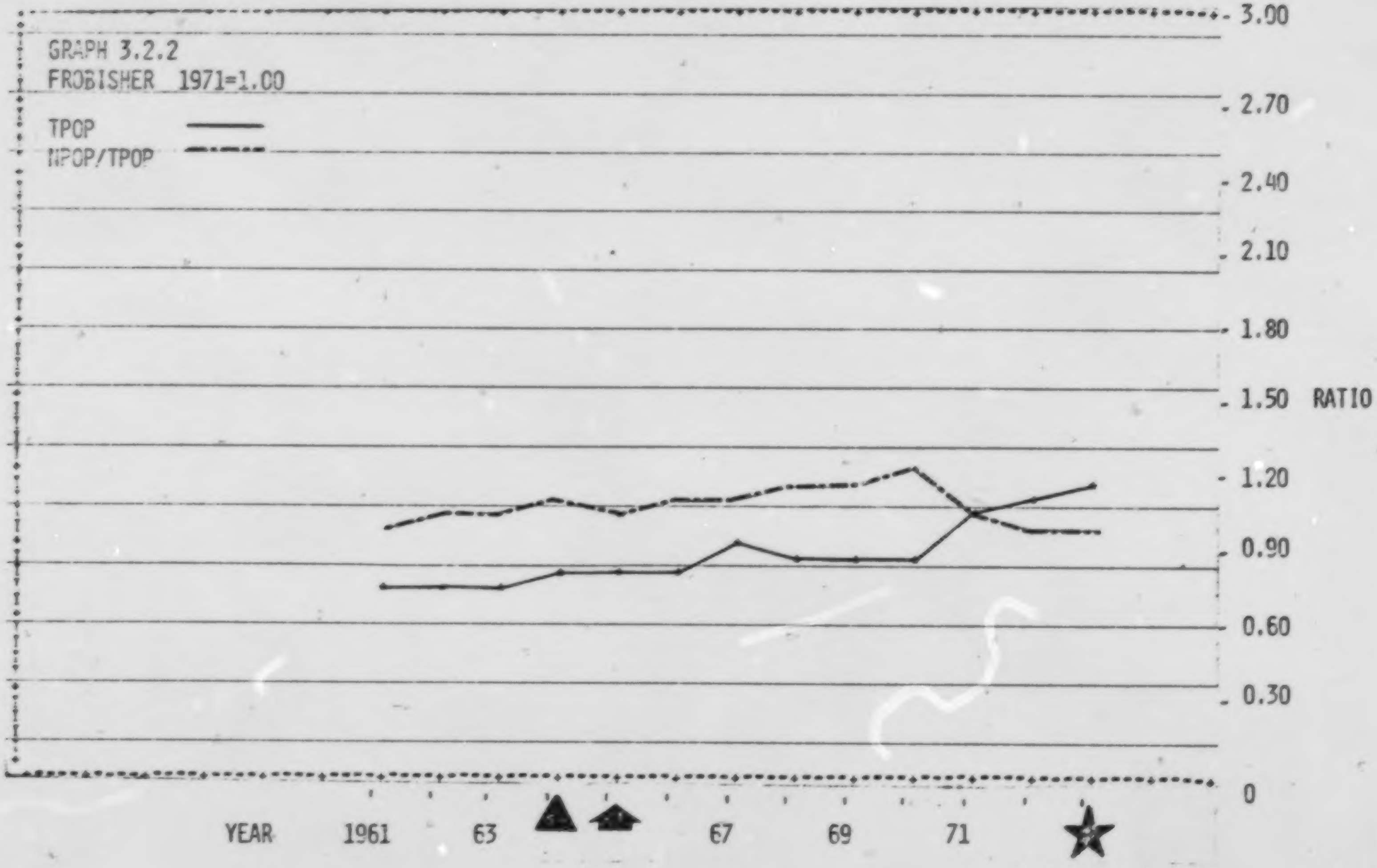
SYMBOLS

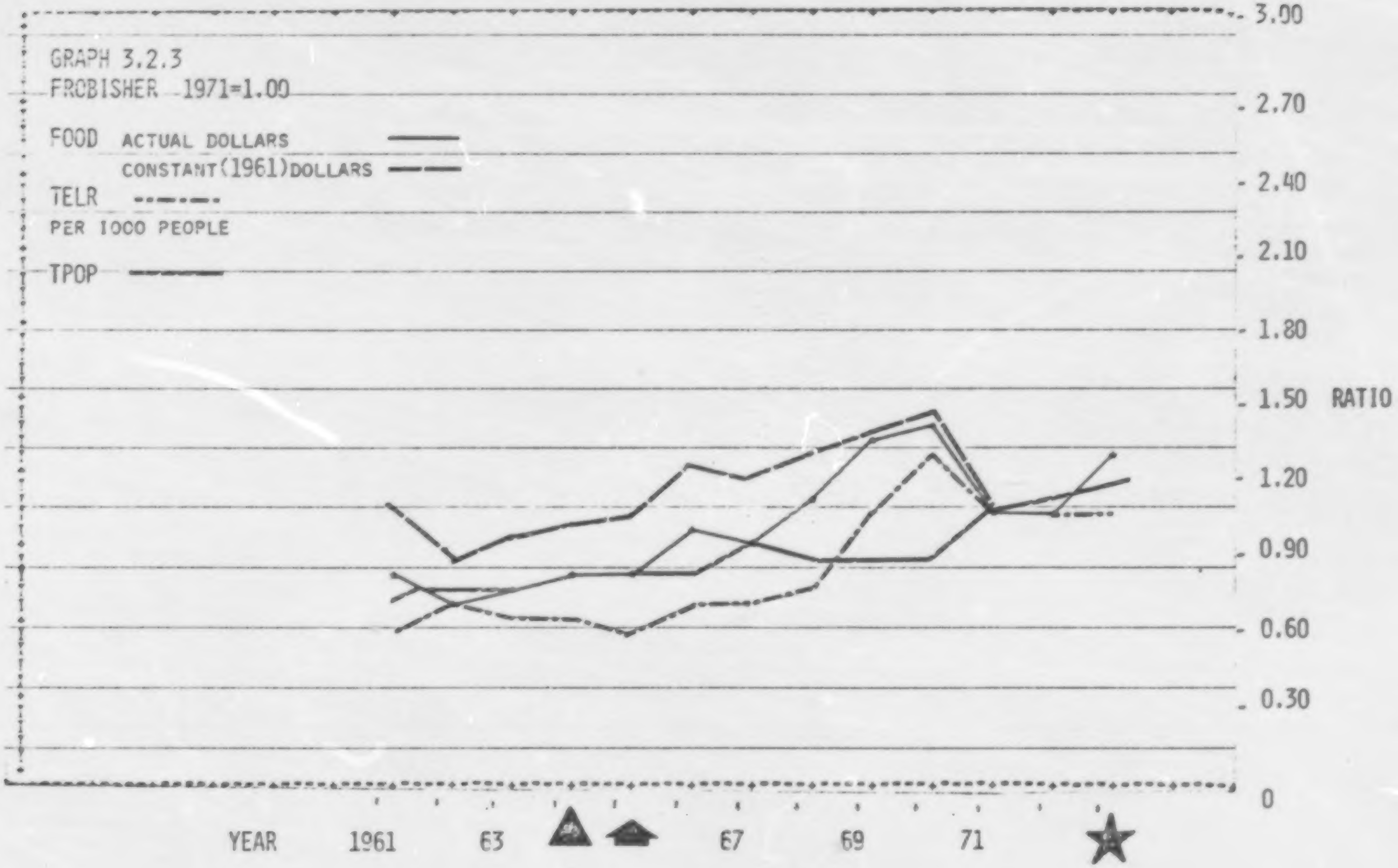
▲	Start of dial telephone service, following upgrading of old exchange, or new installation.
⌂	Start of Federal Rental Housing Program.
★	Start of satellite communications service via Anik.

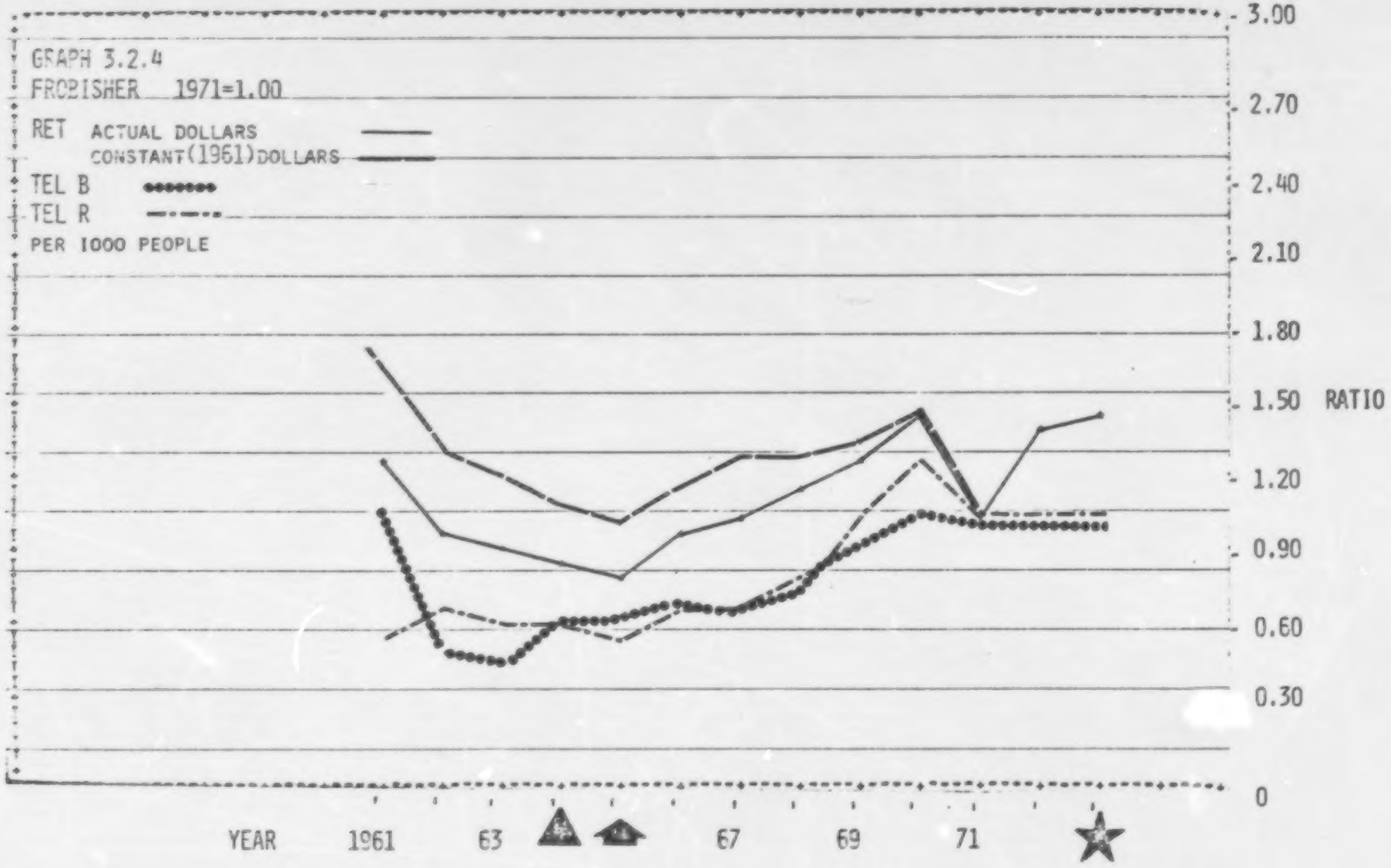


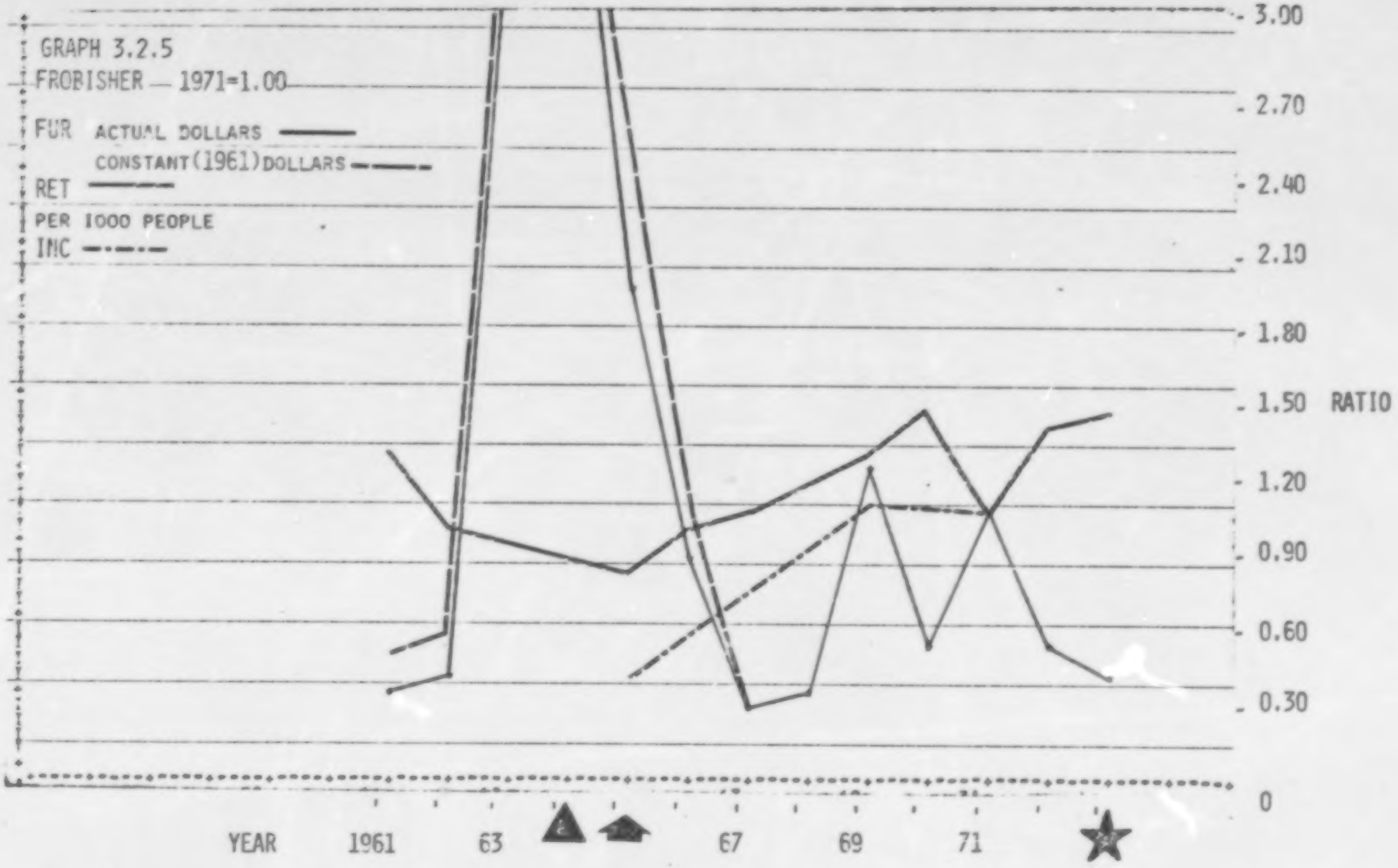
GRAPH 3.2.1

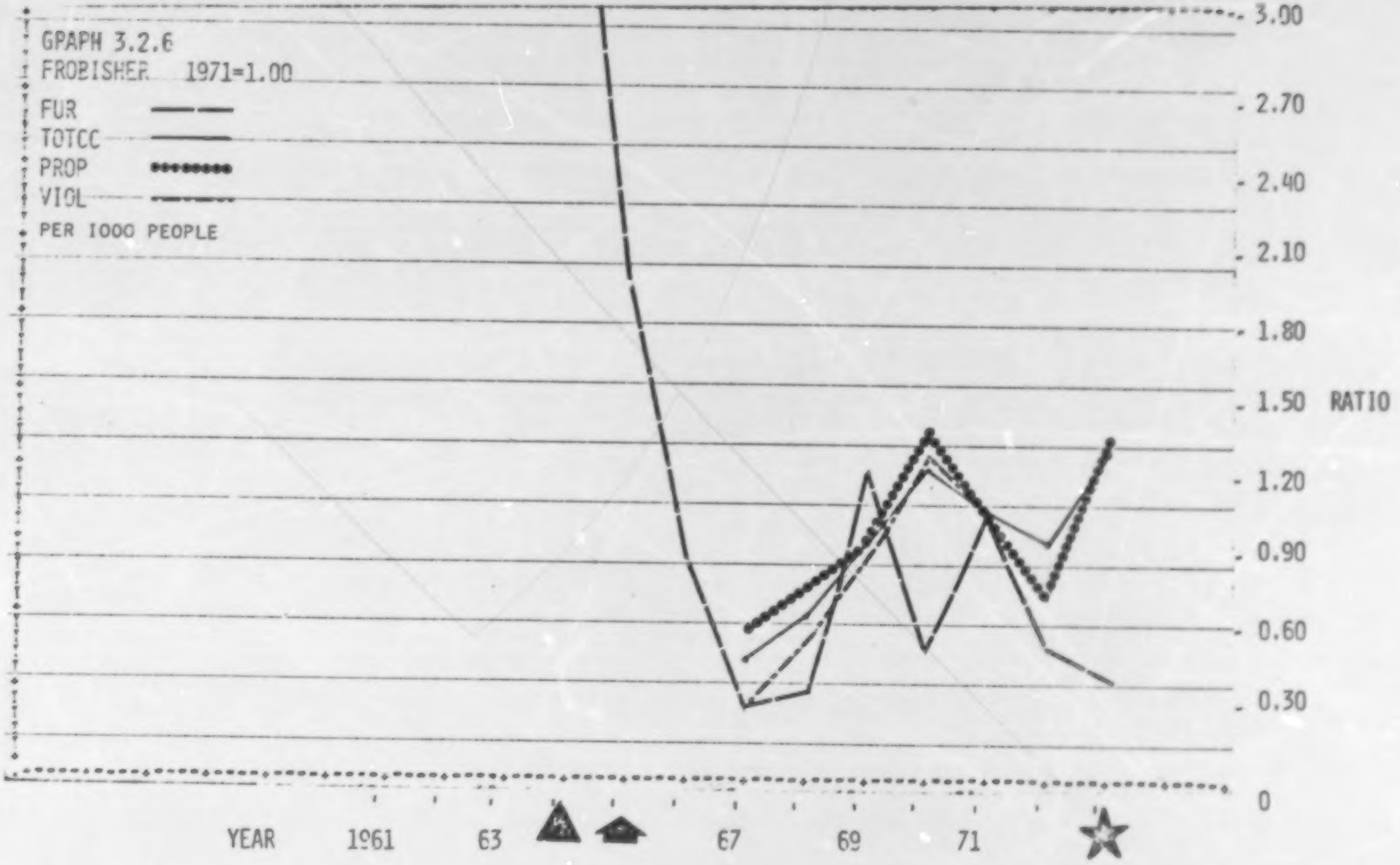
FROBISHER POPULATION IN THOUSANDS

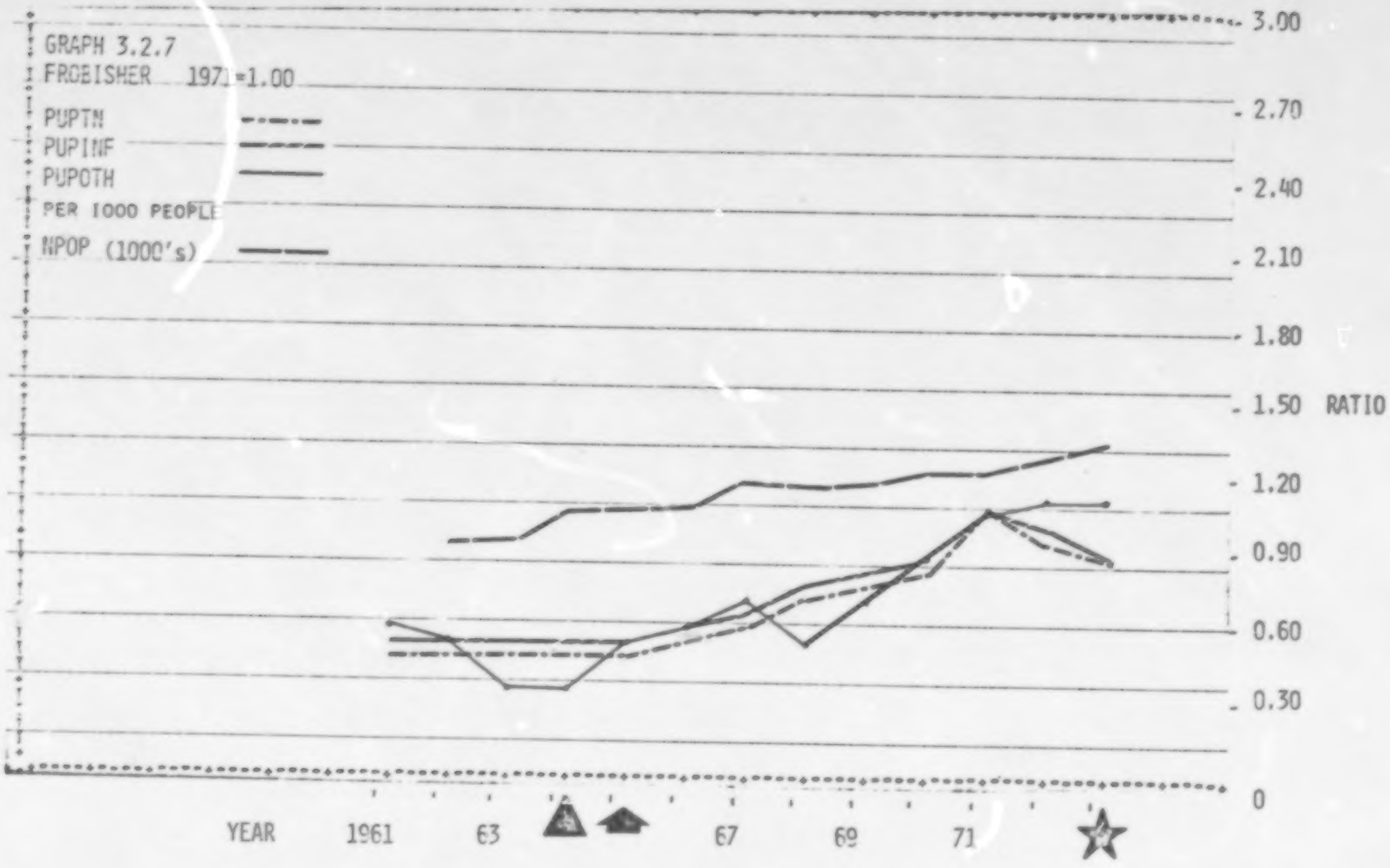

GRAPH 3.2.2
FROBISHER 1971=1.00
TPOP
NPOP/TPOP
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71

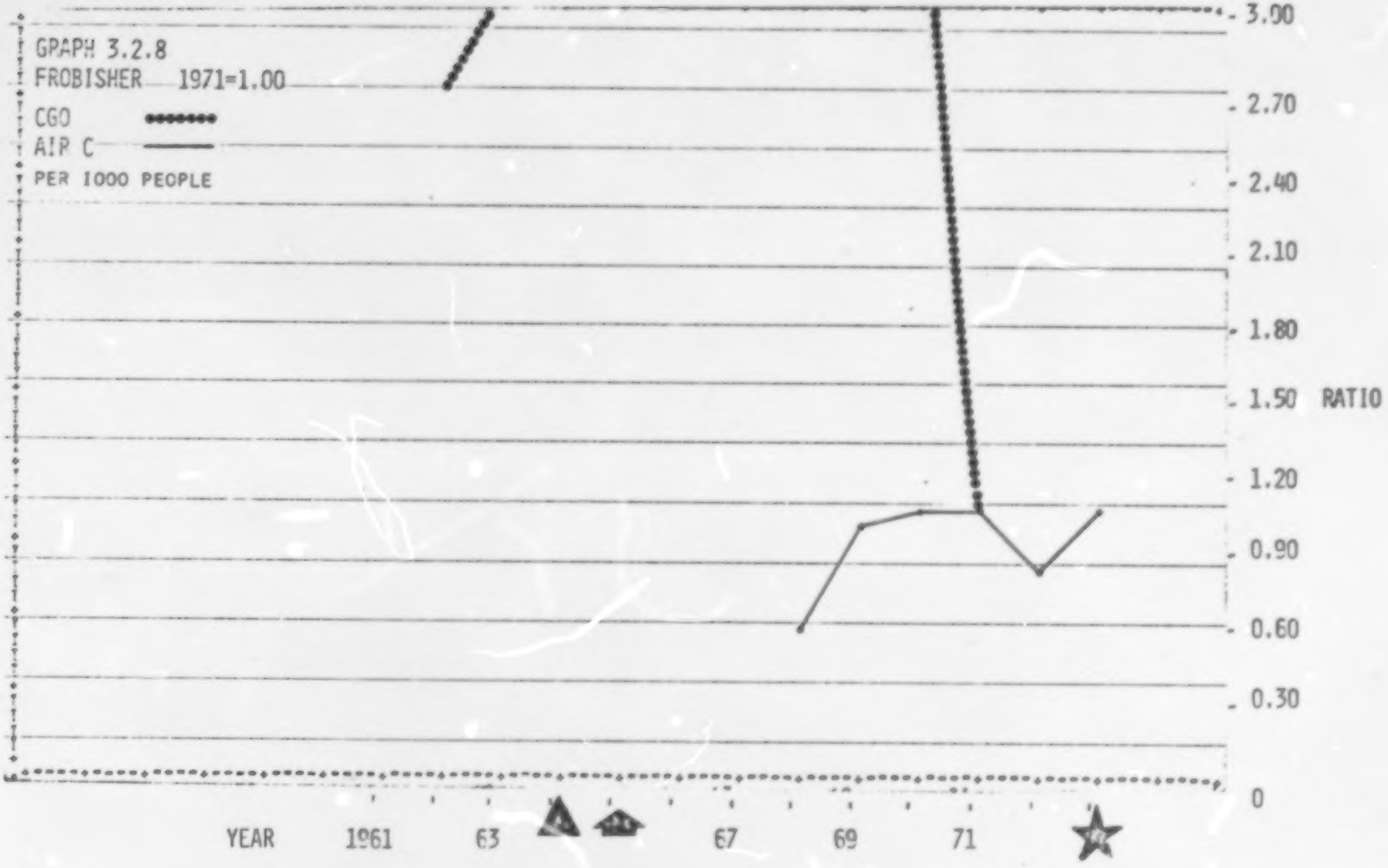

GRAPH 3.2.3
FROBISHER 1971=1.00
FOOD ACTUAL DOLLARS
CONSTANT(1961)DOLLARS
TELR
PER 1000 PEOPLE
TPOP
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71

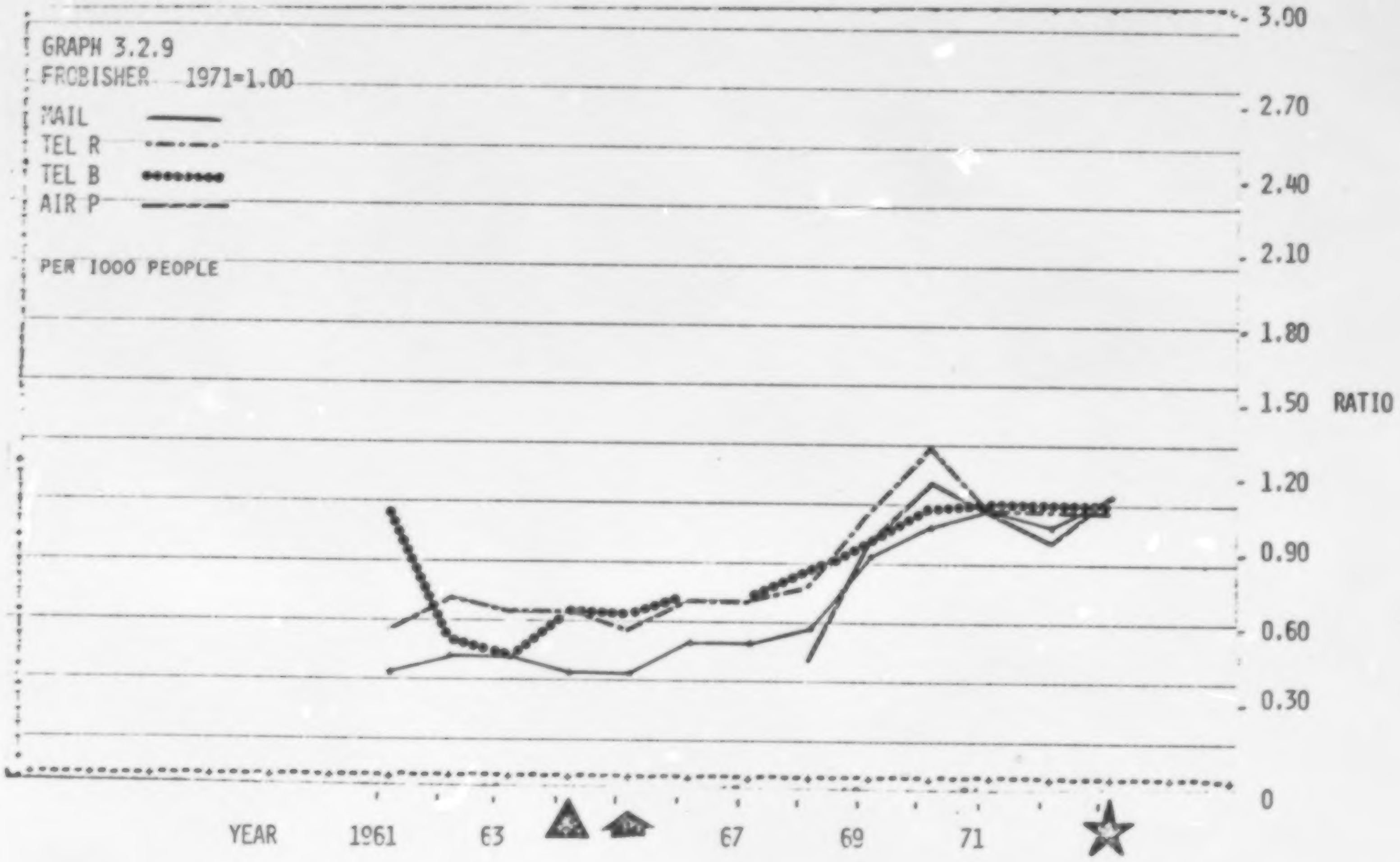

GRAPH 3.2.4
FROBISHER 1971=1.00
RET ACTUAL DOLLARS
CONSTANT(1961)DOLLARS
TEL B
TEL R
PER 1000 PEOPLE
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71

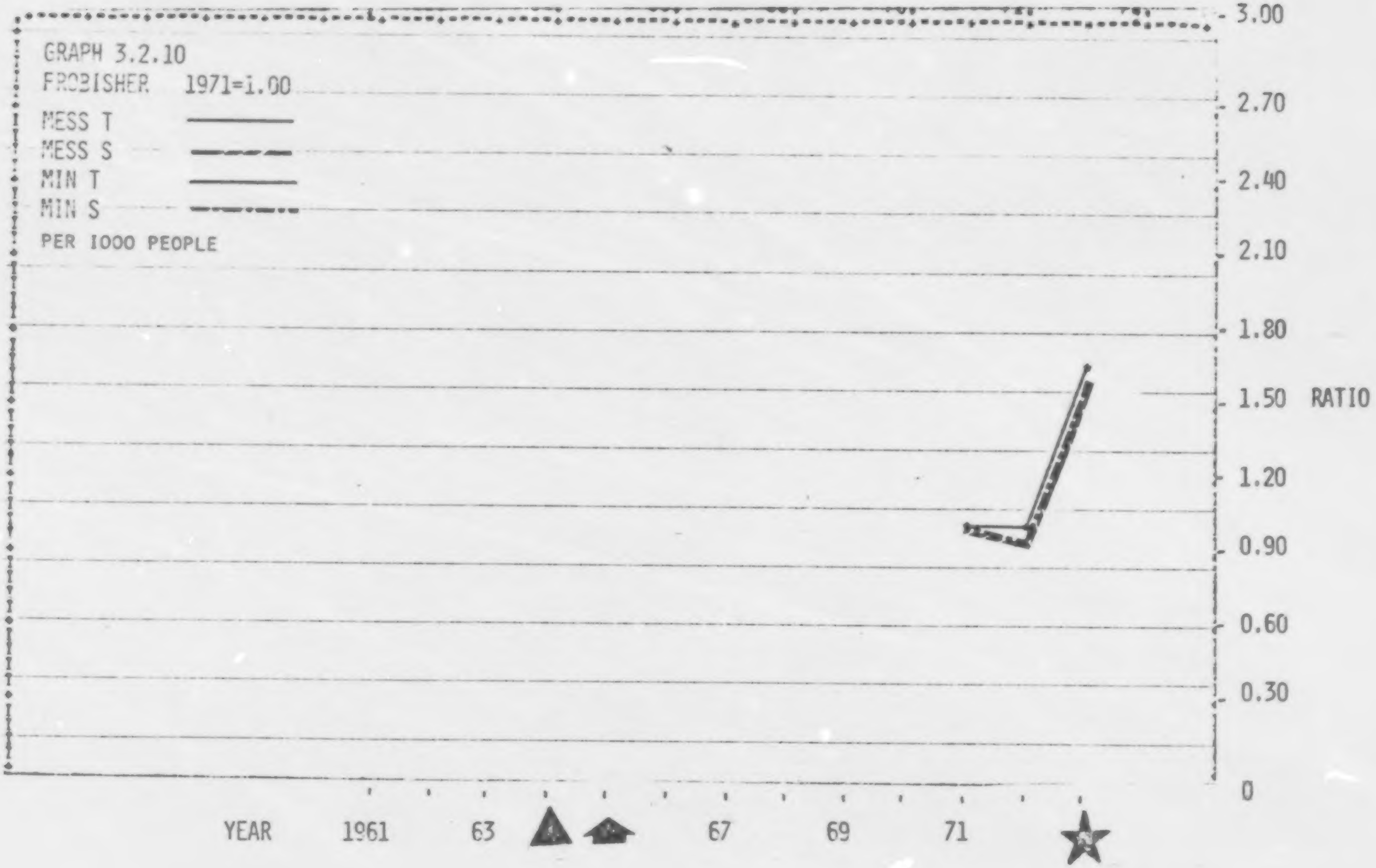

GRAPH 3.2.5
FROBISHER — 1971=1.00
FUR ACTUAL DOLLARS
CONSTANT(1961)DOLLARS
RET
PER 1000 PEOPLE
INC
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.2.6
FROBISHER 1971=1.00
FUR
TOTCC
PROP
VIOL
PER 1000 PEOPLE
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.2.7
FROBISHER 1971=1.00
PUPTN
PUPINF
PUPOTH
PER 1000 PEOPLE
NPOP (1000's)
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.2.8
FROBISHER 1971=1.00
CGO ●●●●●●●
AIR C ———
PER 1000 PEOPLE
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.2.9
FROBISHER 1971=1.00
MAIL
TEL R
TEL B
AIR P
PER 1000 PEOPLE
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.2.10
FROBISHER 1971=1.00
MESS T
MESS S
MIN T
MIN S
PER 1000 PEOPLE
3.00
2.70
2.40
2.10
1.80
1.50
1.20
0.90
0.60
0.30
0
RATIO
YEAR
1961
63
67
69
71

SECTION 3: IGLOOLIK

Time-series data on Igloolik are displayed in Graphs 3.3.1 to 3.3.10. Graph 3.3.1 gives the raw figures for total population and native population. The number of non-natives is so low in this community and those following that they cannot be meaningfully graphed on the 0-3 thousand scale. Over the period studied, total population shows a low rate of increase (Graph 3.3.2). In 1966, 1968, and 1972 there are drops in the proportion of native people in the total population due to influxes of non-natives.

In this community we again see a rapid growth in food sales per 1,000 people, growth beyond that explained by an increase in population or mere inflation (Graph 3.3.3). Looking at food sales in constant dollars, we see that there is an increase in 1970 which is even more abrupt than the increase in the same year at Frobisher. In Igloolik, food sales do not fall off after 1970; however, retail sales do peak in 1970 and fall off in 1971 in a manner similar to that seen in Frobisher (see constant dollar figures, Graph 3.3.4). There is an additional slump in 1968.

There is no evidence of the relationship noted in Frobisher between the number of residential phones installed and food sales; but there is a suggestion of a relationship between the number of business phones installed and retail sales, particularly in the years 1969-1973. Growth in the number of business phones is to be expected if new governmental or commercial services are established; and these new services will consume dry goods rather than food. However, the parallel growth in retail sales and business phones between 1971 and 1973 is out of proportion to the influx over this period of non-native people (who would fill most government posts); it would seem that commercial/governmental activity is stimulated at this point by a few newcomers.

Graph 3.3.5 indicates that in Igloolik, as in Frobisher, fur purchases drop drastically in the mid-sixties. Despite the rapid erosion of this cornerstone of the "traditional economy", income and retail sales begin to rise, suggesting that the native trappers have turned to the wage-welfare economy for their livelihood.

Levels of crime are plotted in Graph 3.3.6. The figures oscillate in a fashion which does not indicate an overall trend. In Igloolik, the annual levels of crime are low - roughly 1/6 the per capita levels in Cape Dorset and Frobisher Bay. This means that in Igloolik chance variation can disproportionately influence the annual difference from 1971 crime levels, particularly in the case of crimes of violence. In this, case, we see in comparing crime levels and fur purchases little suggestion that a rise in crime coincides with slack periods in the traditional economy. However, in 1970, both fur purchases and non-violent crime fall; and, at the same time, retail sales reach a peak in terms of constant dollars (Graph 3.3.4). It would seem that a source of income other than trapping was available in 1970 - possibly jobs connected with the construction of a relatively large number of rental housing units in that year.

Education variables are plotted in Graph 3.3.7. After 1966, growth in the total number of native pupils occurs at a rate far exceeding the rate of growth in the native population. Apparently an increasing proportion of eligible young people are entering school. There are at least 3 factors at work here: first, after 1965, most families have moved in off the land to new housing, so more potential pupils are at hand; secondly, the acculturative effects of "urban" life are inducing more pupils into school; thirdly, with the growth of local schools, fewer pupils are being flown out to residential schools in the south. Evidence of the acculturative effect lies in the fact that enrolment of native females keeps pace with total enrolment. Here again, as in Frobisher, we find no particular parallels between the number of non-native pupils and crime level displayed in the previous graph.

Unfortunately, little data is available on sea cargo reaching Igloolik. Consequently, Graph 3.3.8 shows only air cargo, which shows the surge characteristic of the communication variables displayed in Graph 3.3.9. In contrast to the situation in Frobisher Bay, none of these variables show signs that a plateau signifying saturation has been reached. In 1973, there were 66 business telephones per 1,000 people, compared with 239 in Sioux Lookout; 131 residential phones per 1,000 people compared with 437; and 250 lbs. of mail was delivered, compared with 910 lbs. (This data is summarised in Table 3.6.1.)

Finally, Graph 3.3.10 illustrates the explosive growth of long distance traffic in Igloolik (note the change in the scale along the ordinate). Taking the latest data available we see that in 1974 the number of outgoing calls per 1,000 people in Igloolik is less than 1/3 of the value in Sioux Lookout (see Table 3.6.1). Sixty percent of total calls go into the national network to the south, the rest to other Arctic communities. Of those directed to Arctic communities, virtually all go to Frobisher and Resolute via Anik in 1974; in 1972, all outgoing calls go via HF-radio to Frobisher only. It seems unlikely that long-distance calling in Igloolik has reached a saturation point.

The rapid increases in mail volume, air passengers, air cargo, telephone rental and use in Igloolik indicate that the introduction of new technology-based services into a remote community does not result in a gradual growth in the usage of these services. On the contrary, usage surges towards a hypothetical saturation point over a very short period of time - even in a community which is predominantly native.

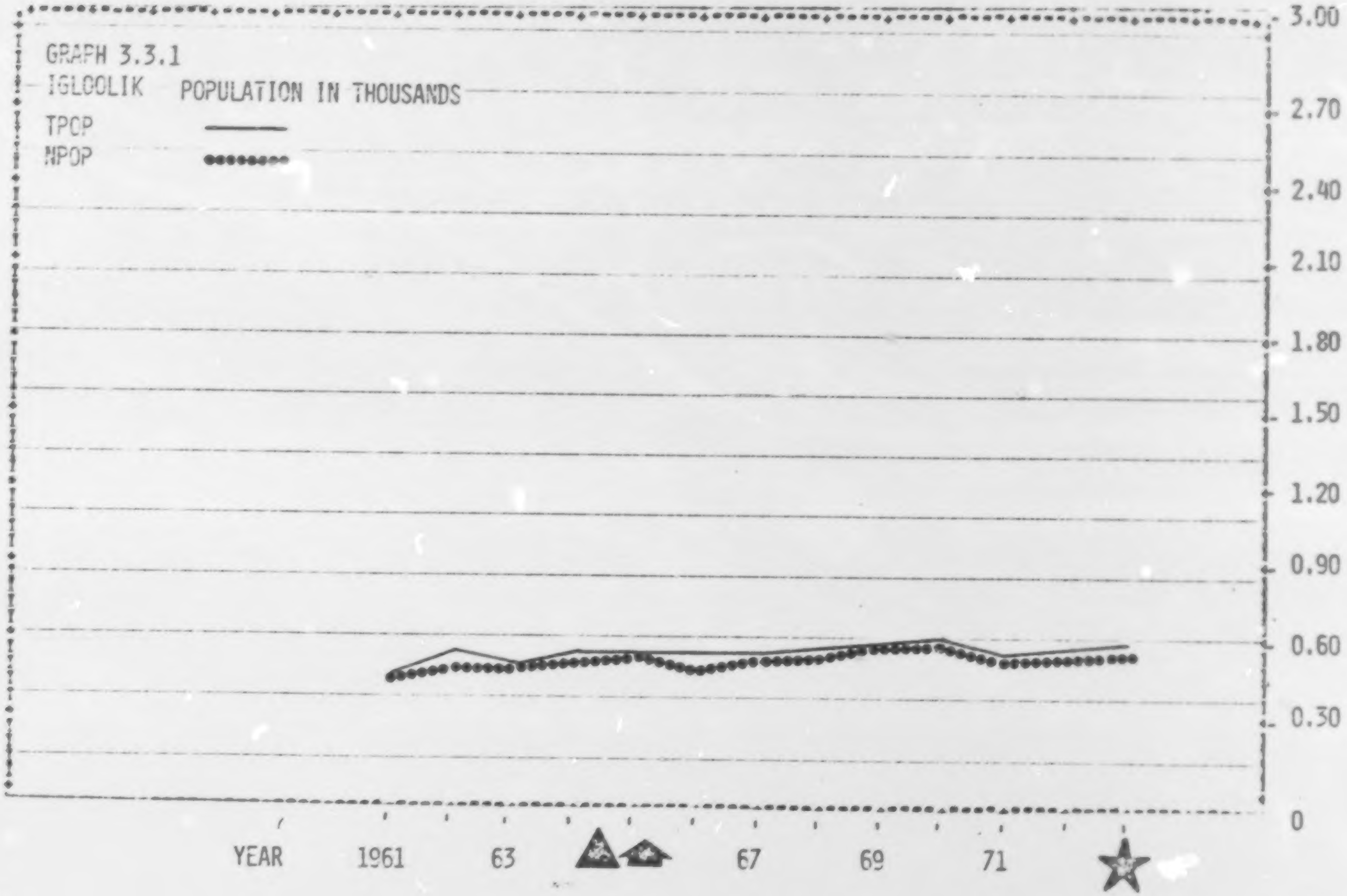
KEY

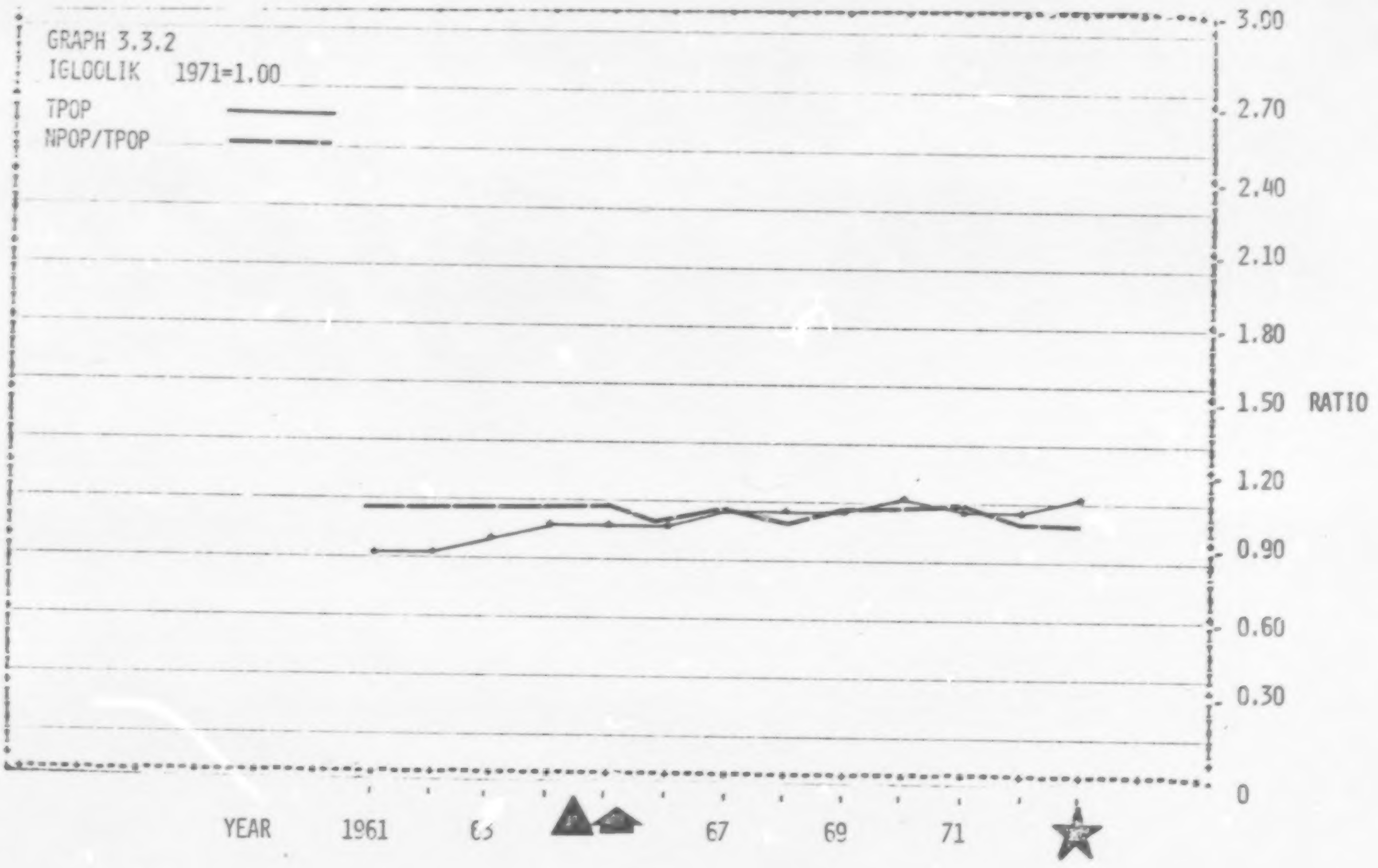
VARIABLES

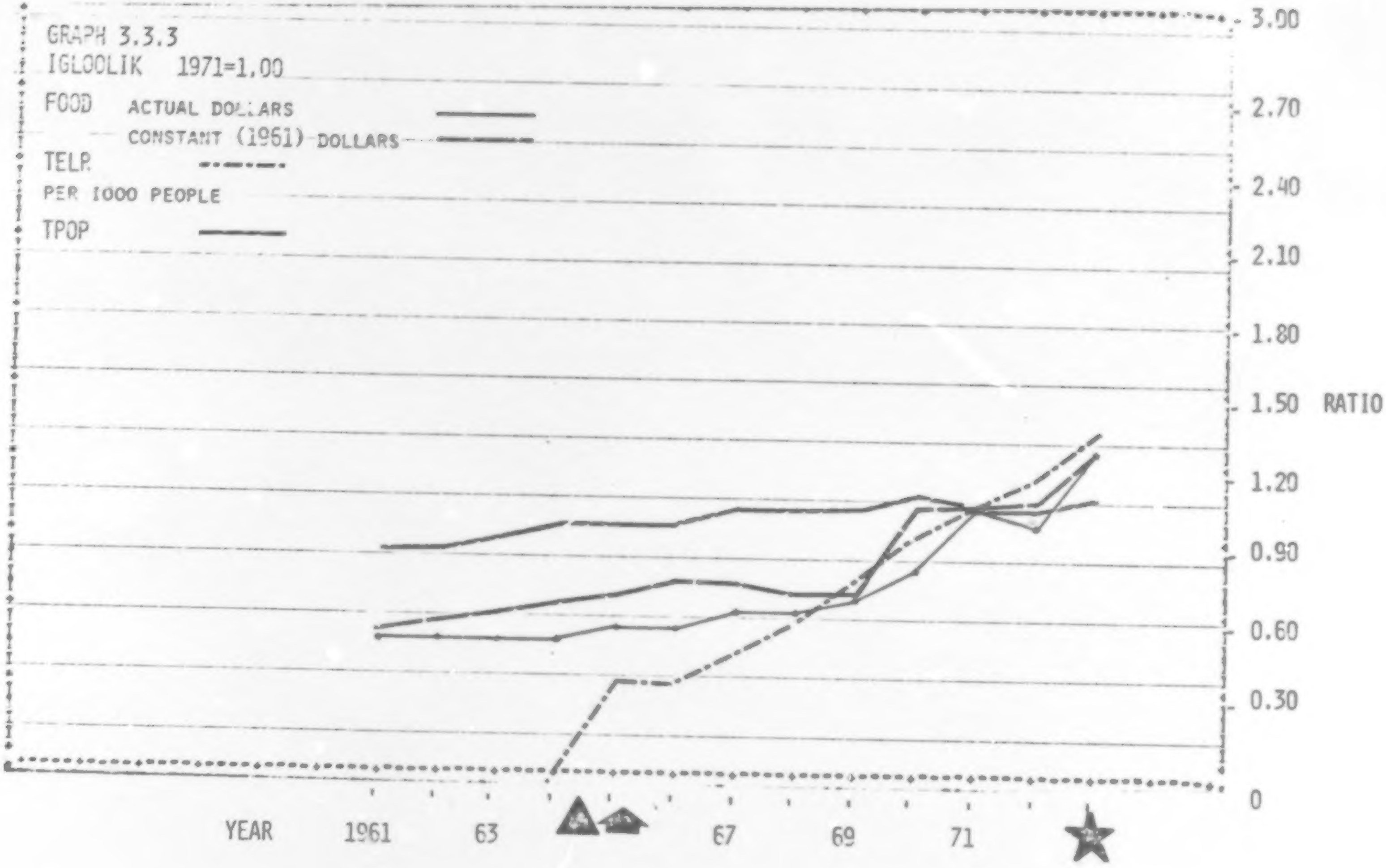
AIR C	Air cargo
AIR P	Air passengers
CGO	Sea cargo
FOOD	Food sales
FUR	Fur purchases
INC	Average family income
MAIL	Mail volume
MESS S	LD telephone calls into national network
MESS T	D telephone calls, total
MIN S	Duration of LD calls into nat. network
MIN T	Duration of LD calls, total
N POP	Native population
NN POP	Non-native population
PROP	Property crime
PUPINF	Pupils, native female
PUPF	Pupils, female (SL)
PUPOTH	Pupils, non-native
PUPT	Pupils, total (SL)
PUPTN	Pupils, total native
RET	Retail sales
TEL B	Business telephones
TEL R	Residential telephones
TEL T	Total telephones (SL)
TOT CC	Total criminal offences
TPOP	Total population
VIOL	Violent crime

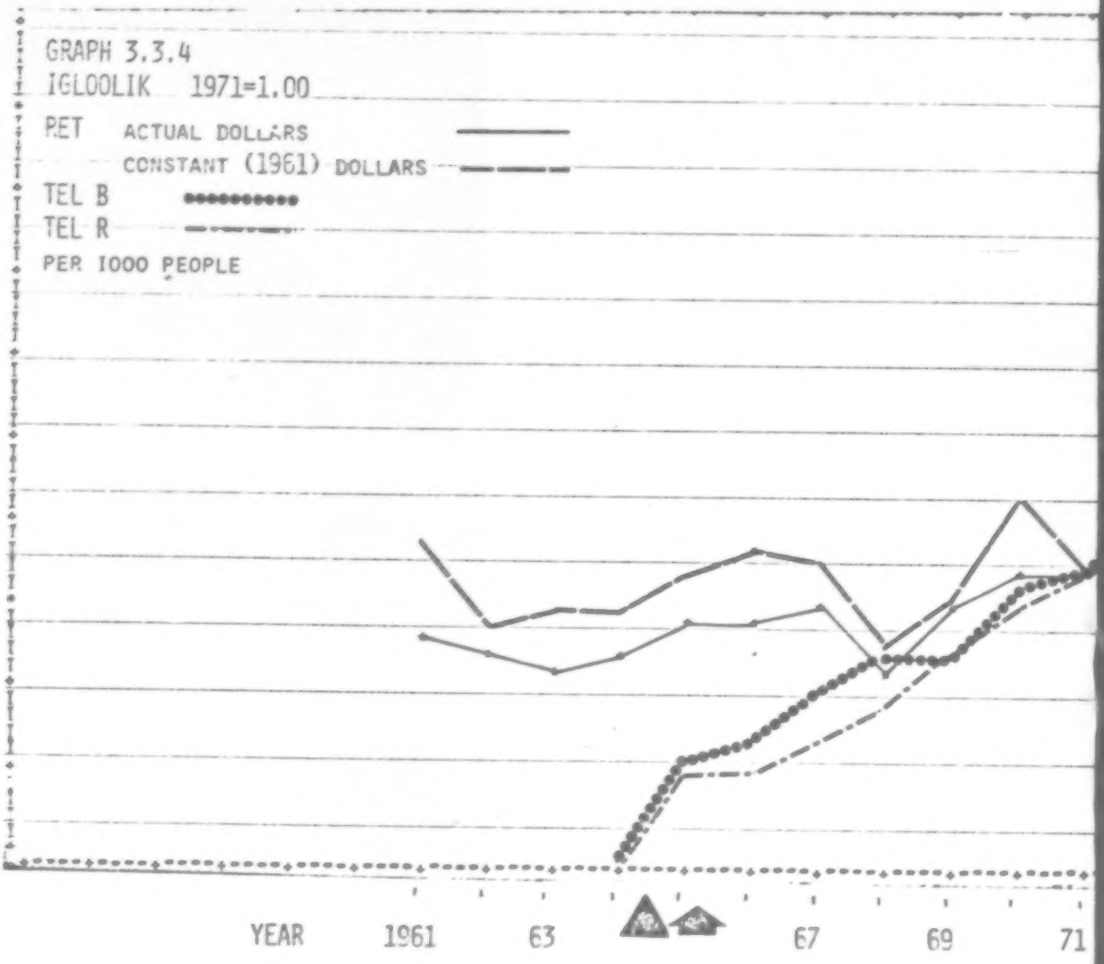
SYMBOLS

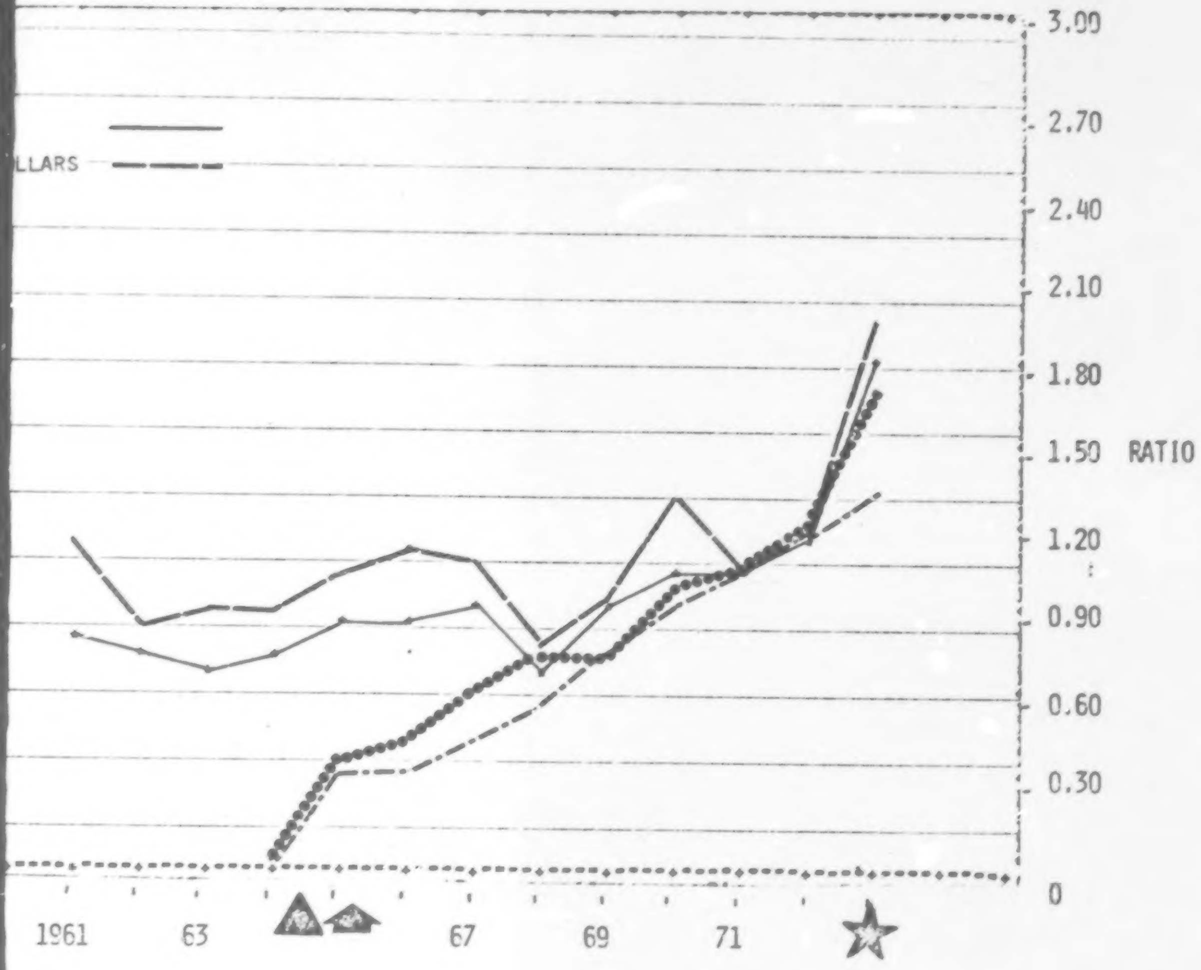
▲	Start of dial telephone service, following upgrading of old exchange, or new installation.
⌂	Start of Federal Rental Housing Program.
★	Start of satellite communications service via Anik.

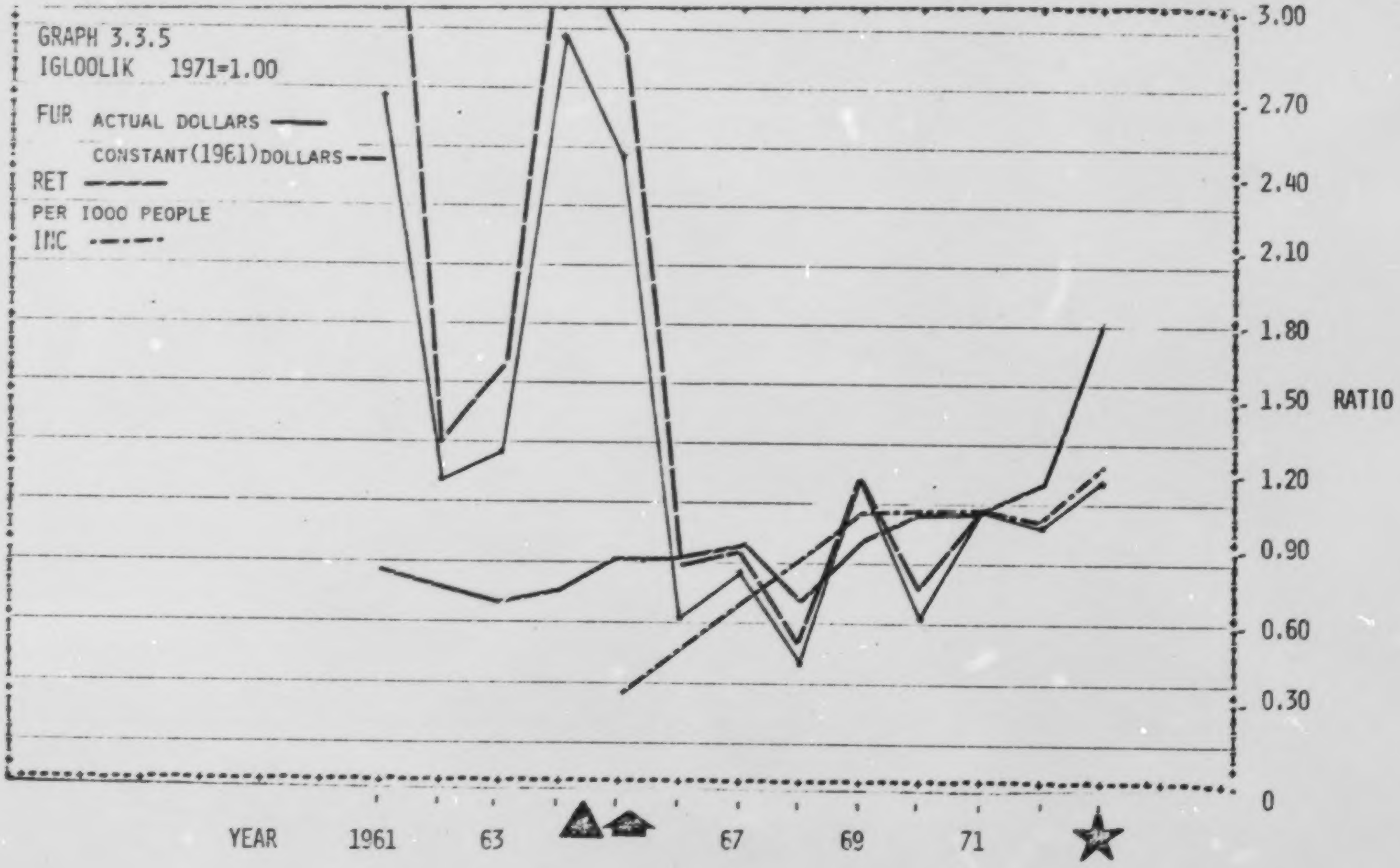

GRAPH 3.3.1
IGLOOLIK POPULATION IN THOUSANDS
TPOP
NPOP ●●●●●●●●
3.00
2.70
2.40
2.10
1.80
1.50
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71

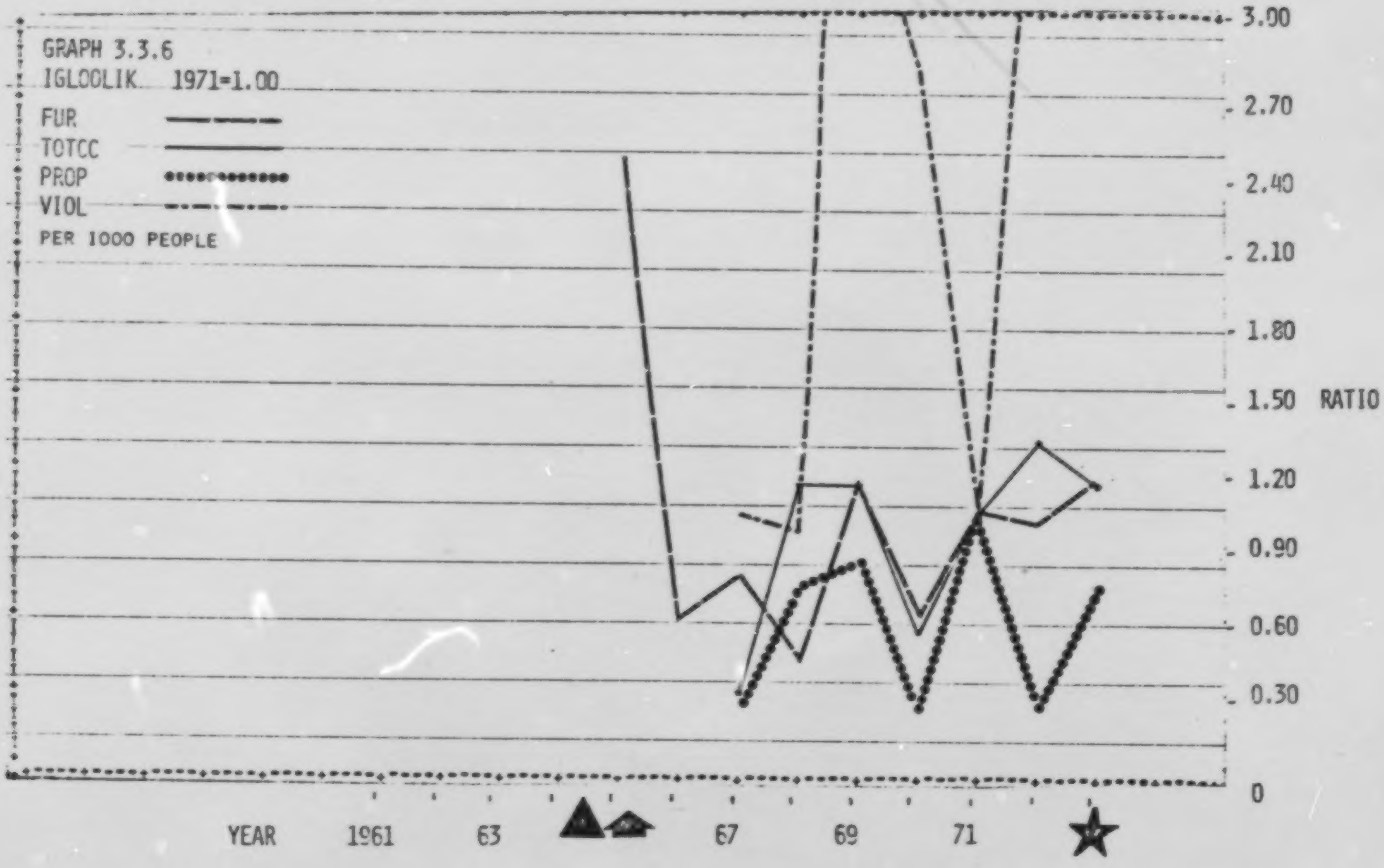

GRAPH 3.3.2
IGLOOLIK 1971=1.00
TPOP
NPOP/TPOP
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71

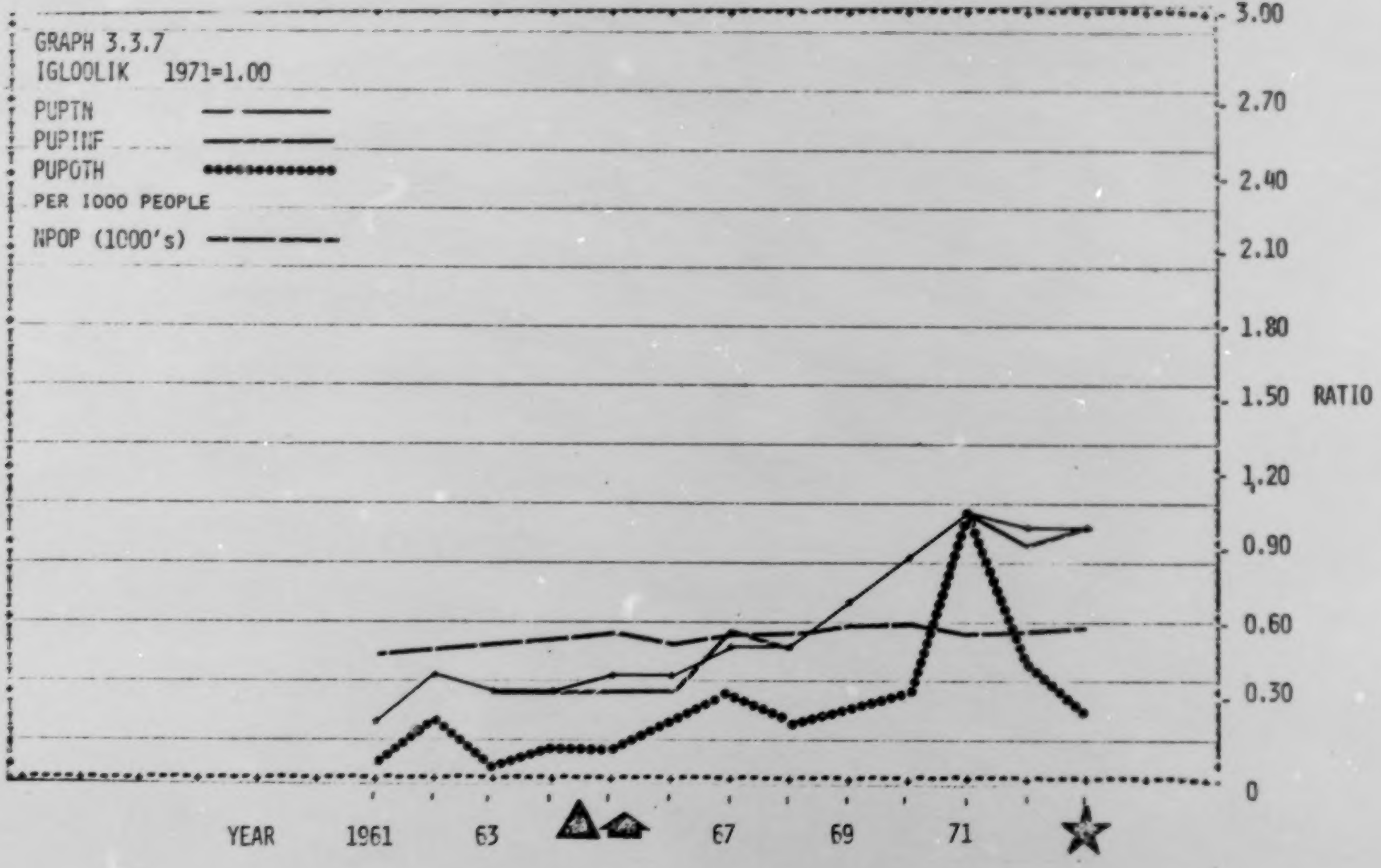

GRAPH 3.3.3
IGLOOLIK 1971=1.00
FOOD ACTUAL DOLLARS
CONSTANT (1961) DOLLARS
TELP.
PER 1000 PEOPLE
TPOP
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71

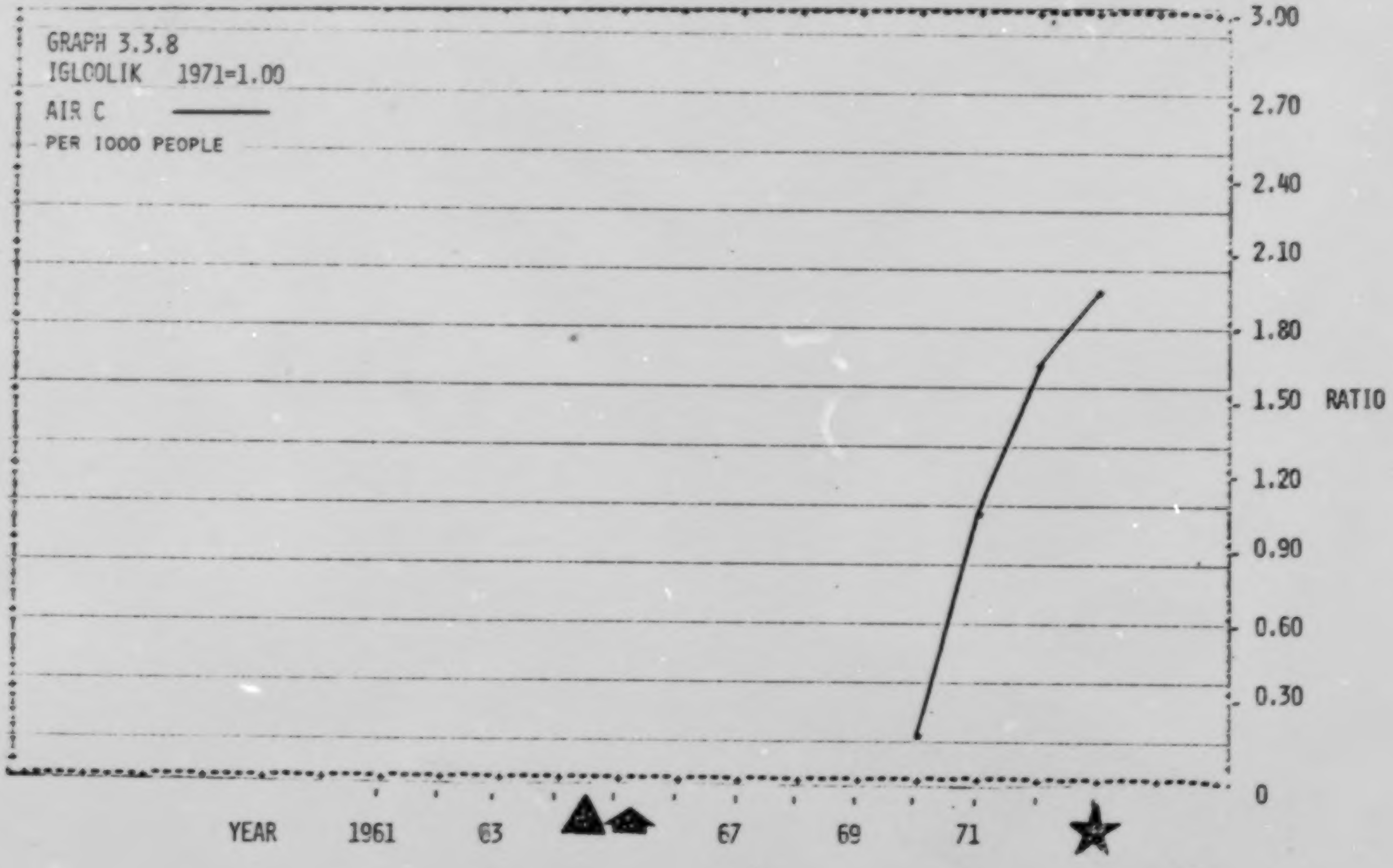

GRAPH 3.3.4
IGLOOLIK 1971=1.00
RET ACTUAL DOLLARS
CONSTANT (1961) DOLLARS
TEL B
TEL R
PER 1000 PEOPLE
YEAR
1961
63
67
69
71

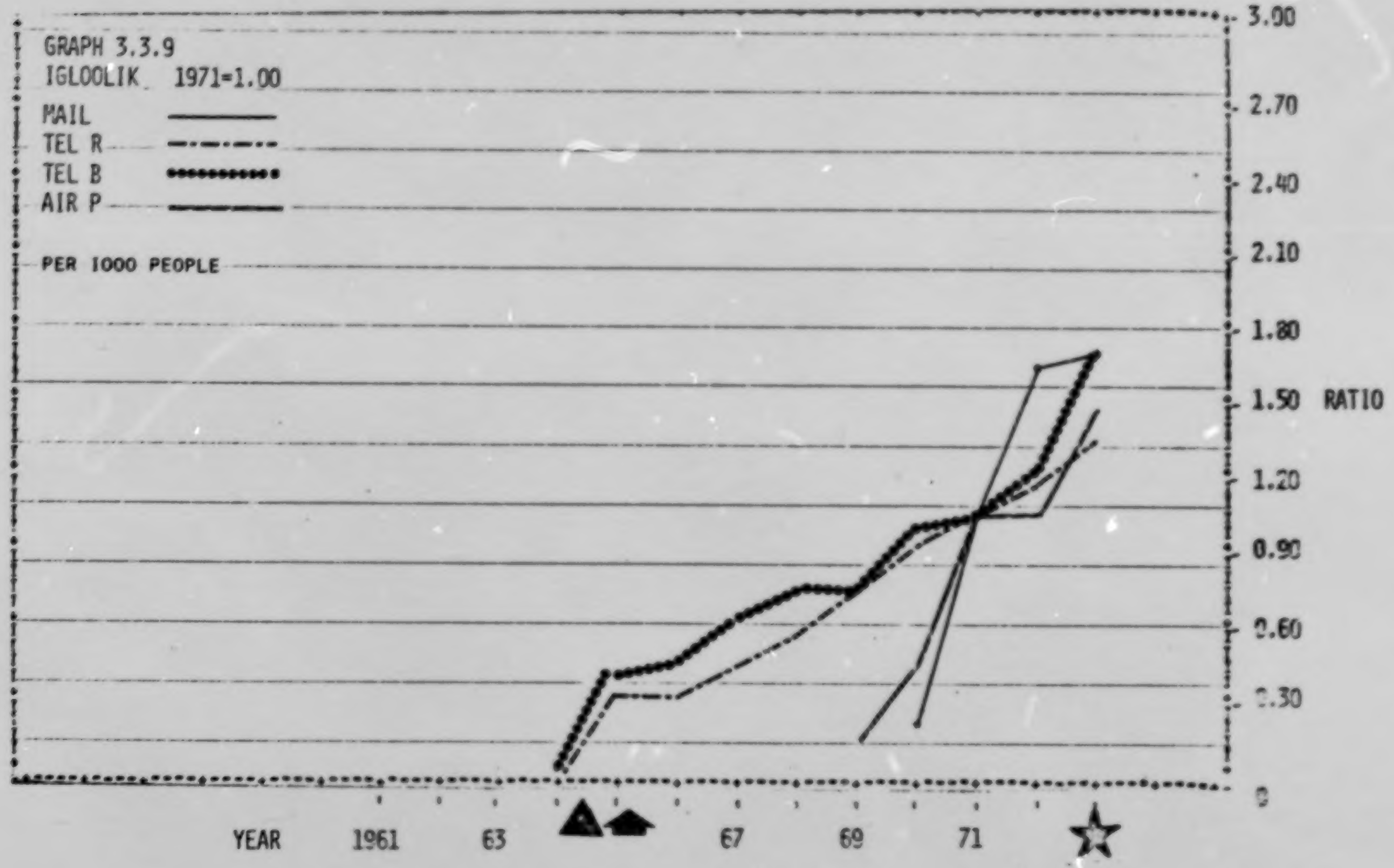

LLARS
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
1961
63
67
69
71

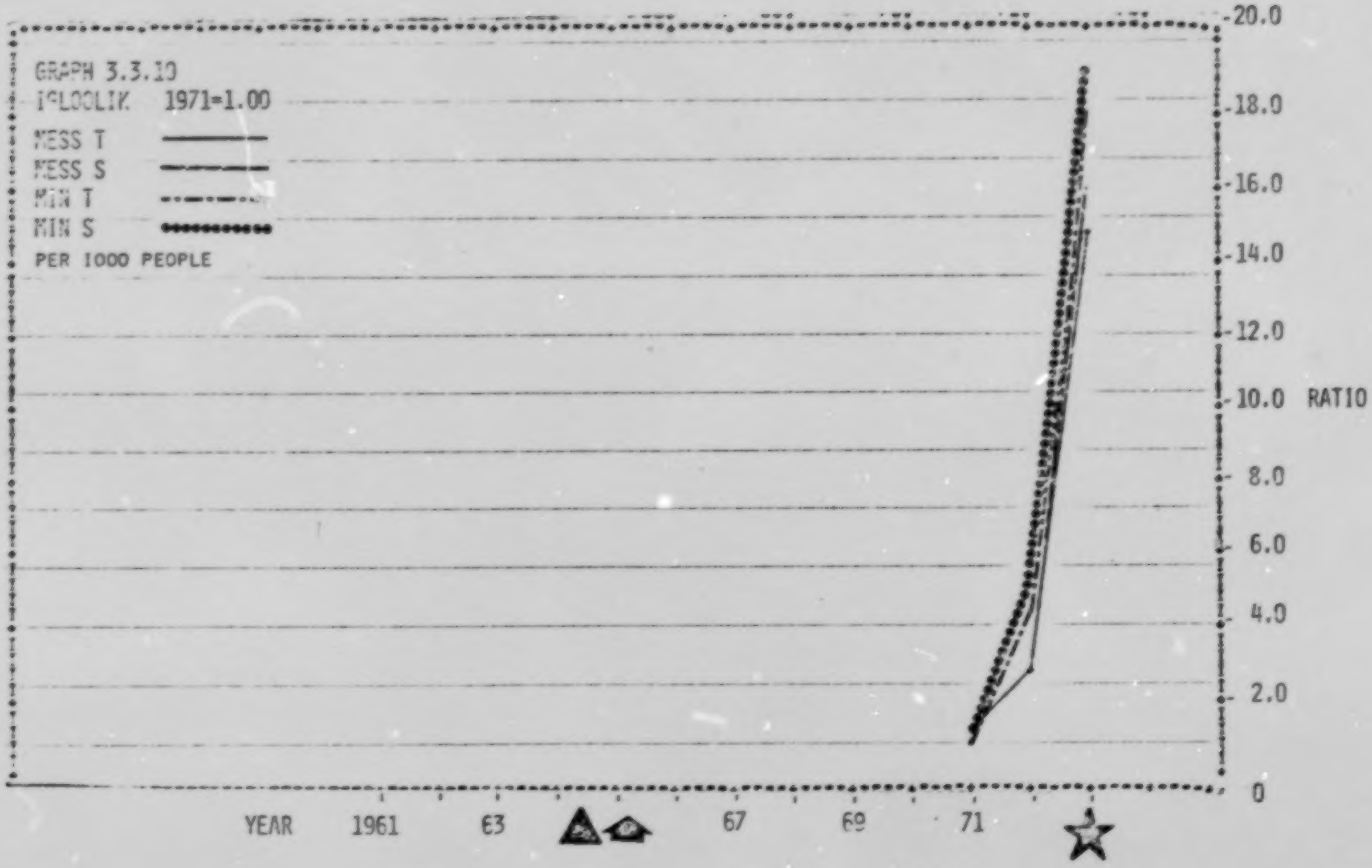

GRAPH 3.3.5
IGLOOLIK 1971=1.00
FUR ACTUAL DOLLARS
CONSTANT(1961)DOLLARS
RET
PER 1000 PEOPLE
INC
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.3.6
IGLOOLIK 1971=1.00
FUR
TOTCC
PROP
VIOL
PER 1000 PEOPLE
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.3.7
IGLOOLIK 1971=1.00
PUPTN
PUPINF
PUPOTH
PER 1000 PEOPLE
NPOP (1000's)
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.3.8
IGLOOLIK 1971=1.00
AIR C
PER 1000 PEOPLE
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.3.9
IGLOOLIK 1971=1.00
MAIL
TEL R
TEL B
AIR P
PER 1000 PEOPLE
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.3.10
IGLOOLIK 1971=1.00
MESS T
MESS S
MIN T
MIN S
PER 1000 PEOPLE
20.0
18.0
16.0
14.0
12.0
10.0
RATIO
8.0
6.0
4.0
2.0
0
YEAR
1961
63
67
69
71

SECTION 4: CAPE DORSET

Time-series data on Cape Dorset are presented in Graphs 3.4.1 to 3.4.10. Here the rate of growth in total population is greater than in communities examined previously. Total population in Cape Dorset doubles over the period 1961-71; thereafter, it appears to level off. The proportion of natives in the population remains very stable, except for the increases of about 10% in 1965 and 1968 (Graph 3.4.2). In both cases the rise in the proportion of natives is due to a drop in the number of non-natives (i.e. the difference between total and native population in Graph 3.4.1).

Both food sales (Graph 3.4.3) and retail sales (Graph 3.4.4) per 1,000 people increase at a rate generally parallel to the growth in total population, up to 1972; thereafter, sales accelerate rapidly while population falls off. Note that this means that per capita trade is rising gradually at first and then more rapidly. However, the number of residential telephones - which in Frobisher seemed to reflect disposable income - fluctuates erratically with respect to sales (food or retail); but the number of business telephones increases in a fashion roughly parallel to the trend in retail sales. As in Igloolik, we see rapid increases in business telephones in 1971 and 1973, perhaps reflecting growth in commercial and/or governmental services. In this case, there is neither a coincident change in net population, nor in its makeup (compare Graphs 3.4.2 and 3.4.4).

The typical trend in fur purchases is repeated in Graph 3.4.5. Again, despite the erosion of the traditional economy, family income and retail sales increase steadily. Note that a surge in fur purchases in 1969 appears to contribute to income and sales levels; and a surge in 1973 appears to contribute to both retail sales and food sales (Graph 3.4.3).

Applying the fur-purchases trend to the crime figures (Graph 3.4.6) we see that troughs in this indication of the traditional economy correspond with peaks in the incidence of crime, and vice versa. Crime increases rapidly between 1967 and 1973, to a per capita level more than 6 times the level in Igloolik. In fact, the per capita incidence of violent crime is 1.1 times the Frobisher level in 1973; however, property crime and total criminal code offences rise to 1/2 the Frobisher level in the same year.

The total number of native pupils, and the number of female pupils, increase at about the same rate as total population (Graph 3.4.7). In Cape Dorset, the growth in the proportion of eligible natives in school begins earlier and is more gradual than in Frobisher and Igloolik. The peaks in total native pupils for 1966 and 1969 are strangely reminiscent of the peaks in the native fraction of the total population for 1965 and 1968 (Graph 3.4.2); one must recall that the peaks in the native fraction of the total population were largely caused by a drop in the non-native population rather than a rise in the native numbers.

Available data on sea cargo show a gradual decline, while air cargo shows a rapid increase once this service begins in the late sixties (Graph 3.4.8).

While change in the number of telephones is sluggish and erratic, change in mail volume and air passengers follows the rapidly accelerating trend seen in other communities (Graph 3.4.9). Although residential telephone subscriptions fall off, mail volume increases. Neither mail volume nor air passenger traffic shows as deep a decline in 1972 as business telephones.

The numbers of business and residential telephones per 1,000 people in Cape Dorset oscillate at roughly 1/5 the respective levels in Sioux Lookout (see Table 3.6.1). While telephone rental does not "take-off" in this community, usage does show more rapid growth over the same years in which rentals drop off (Graph 3.4.10). Telephone traffic in this period grows at a rate approximating the rates for new services - mail and air travel - even though the telephone service is relatively "old" and is not blessed with any advances in local equipment over these years. It seems that the number of subscribers and the amount of traffic can wax and wane independently - presumably for different reasons.

Roughly half of the outgoing calls in 1972 and 1974 are directed southward, half to other Arctic communities. In both cases, HF-radio must be used, on the initial stage. However, by 1974 a larger proportion of calls to places within the Territories are going to communities served by Anik.

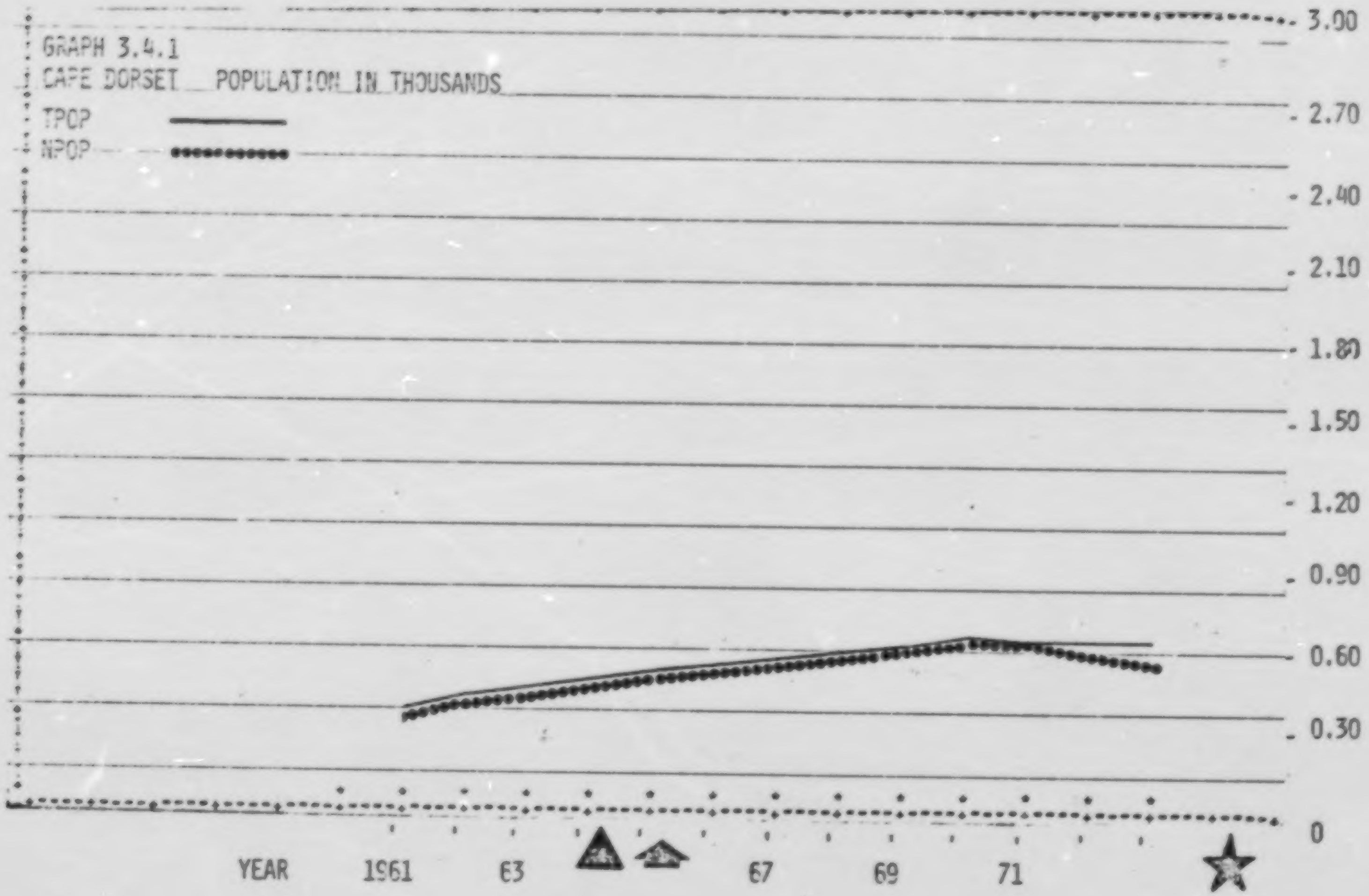
KEY

VARIABLES

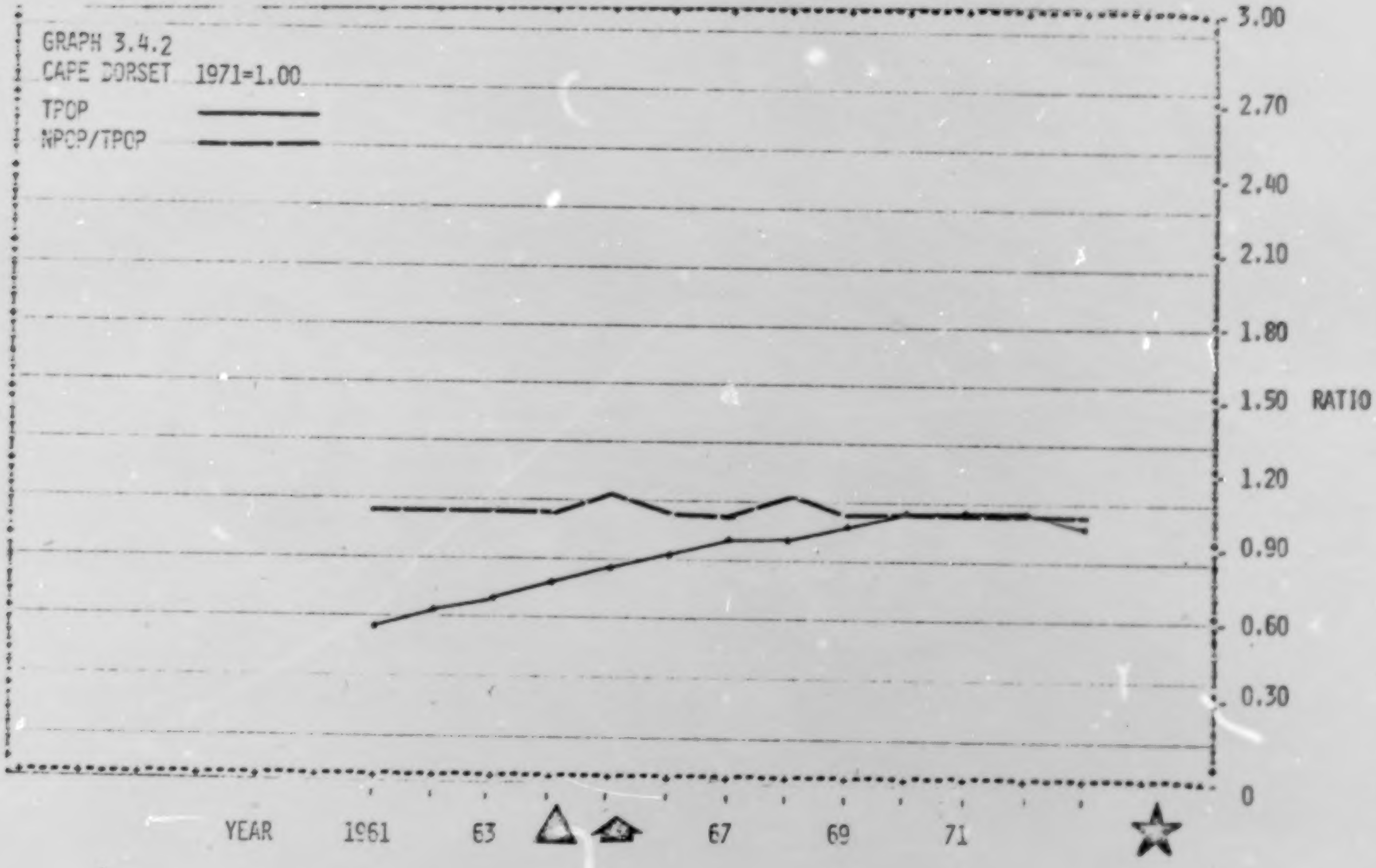
AIR C	Air cargo
AIR P	Air passengers
CGO	Sea cargo
FOOD	Food sales
FUR	Fur purchases
INC	Average family income
MAIL	Mail volume
MESS S	LD telephone calls into national network
MESS T	D telephone calls, total
MIN S	Duration of LD calls into nat. network
MIN T	Duration of LD calls, total
N POP	Native population
NN POP	Non-native population
PROP	Property crime
PUPINF	Pupils, native female
PUPF	Pupils, female (SL)
PUPOTH	Pupils, non-native
PUPT	Pupils, total (SL)
PUPTN	Pupils, total native
RET	Retail sales
TEL B	Business telephones
TEL R	Residential telephones
TEL T	Total telephones (SL)
TOT CC	Total criminal offences
TPOP	Total population
VIOL	Violent crime

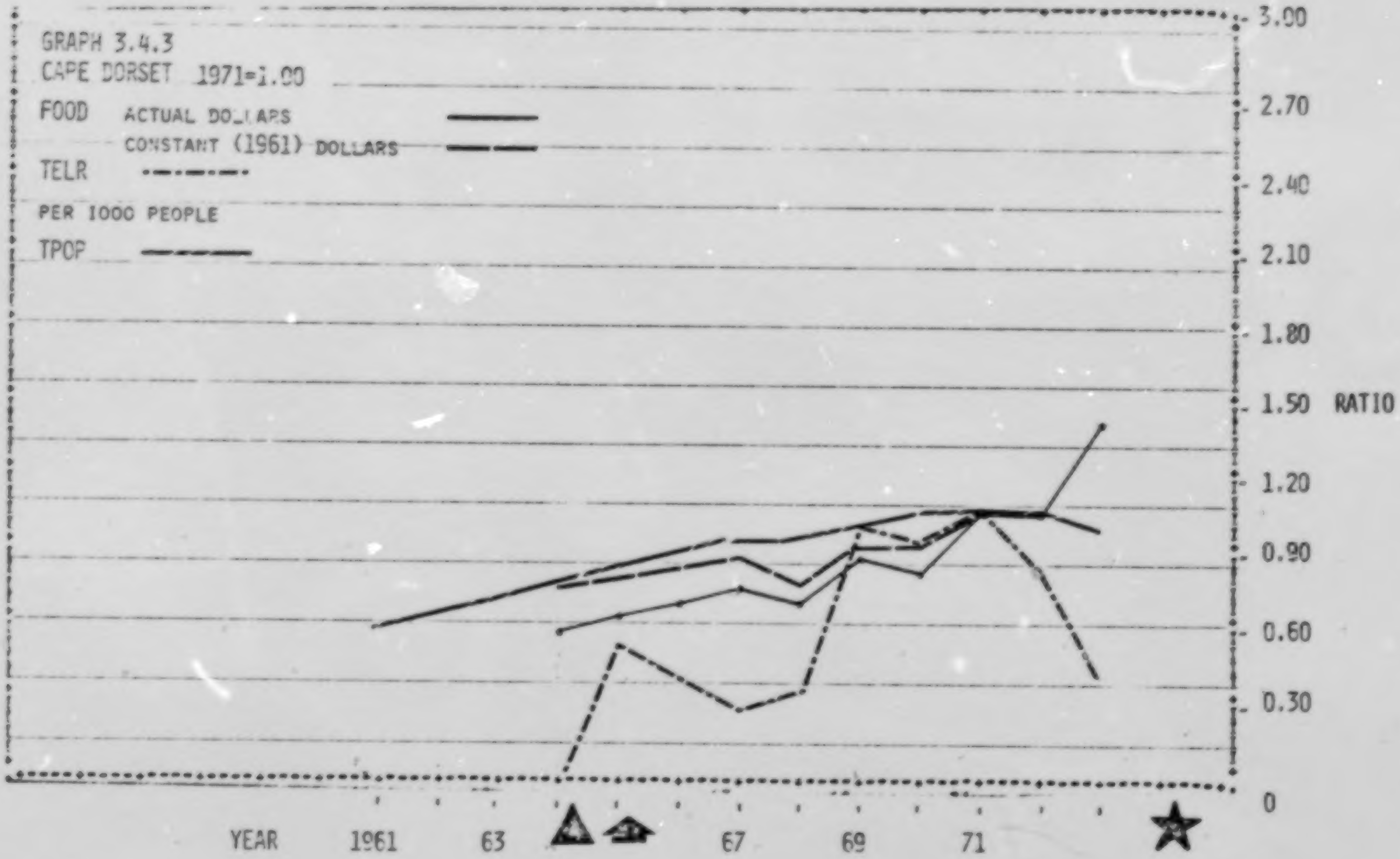
SYMBOLS

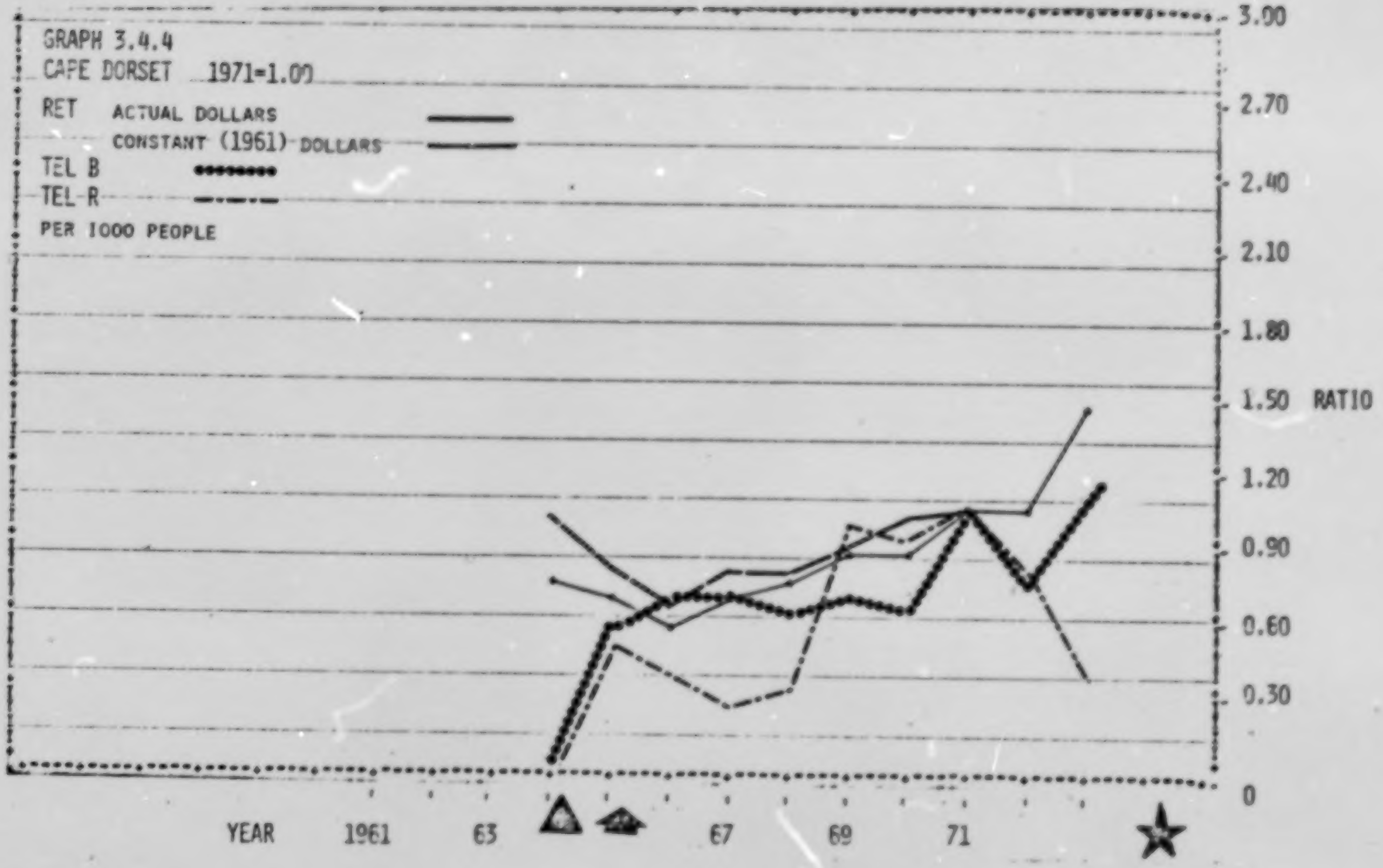
▲	Start of dial telephone service, following upgrading of old exchange, or new installation.
⌂	Start of Federal Rental Housing Program.
★	Start of satellite communications service via Anik.

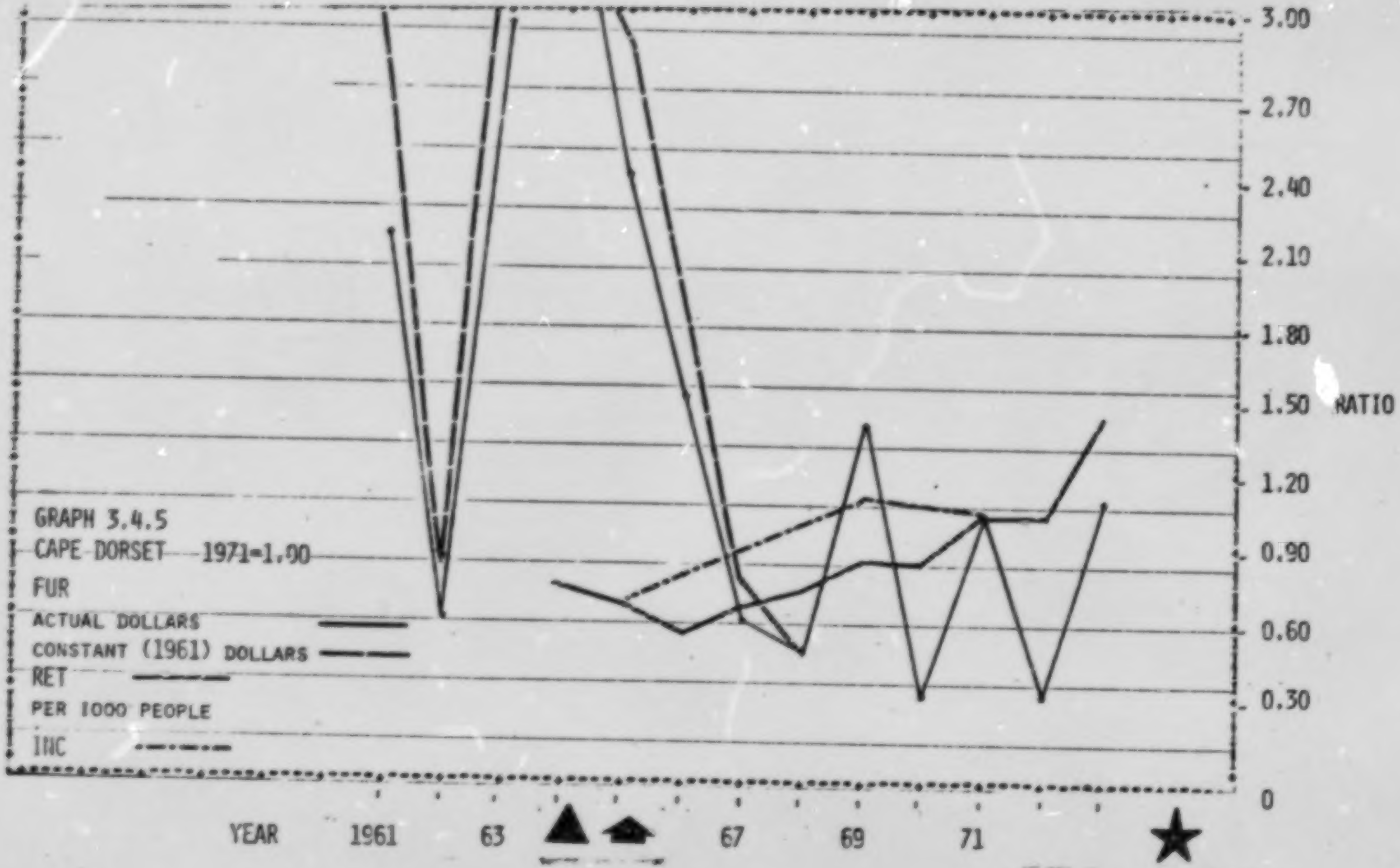


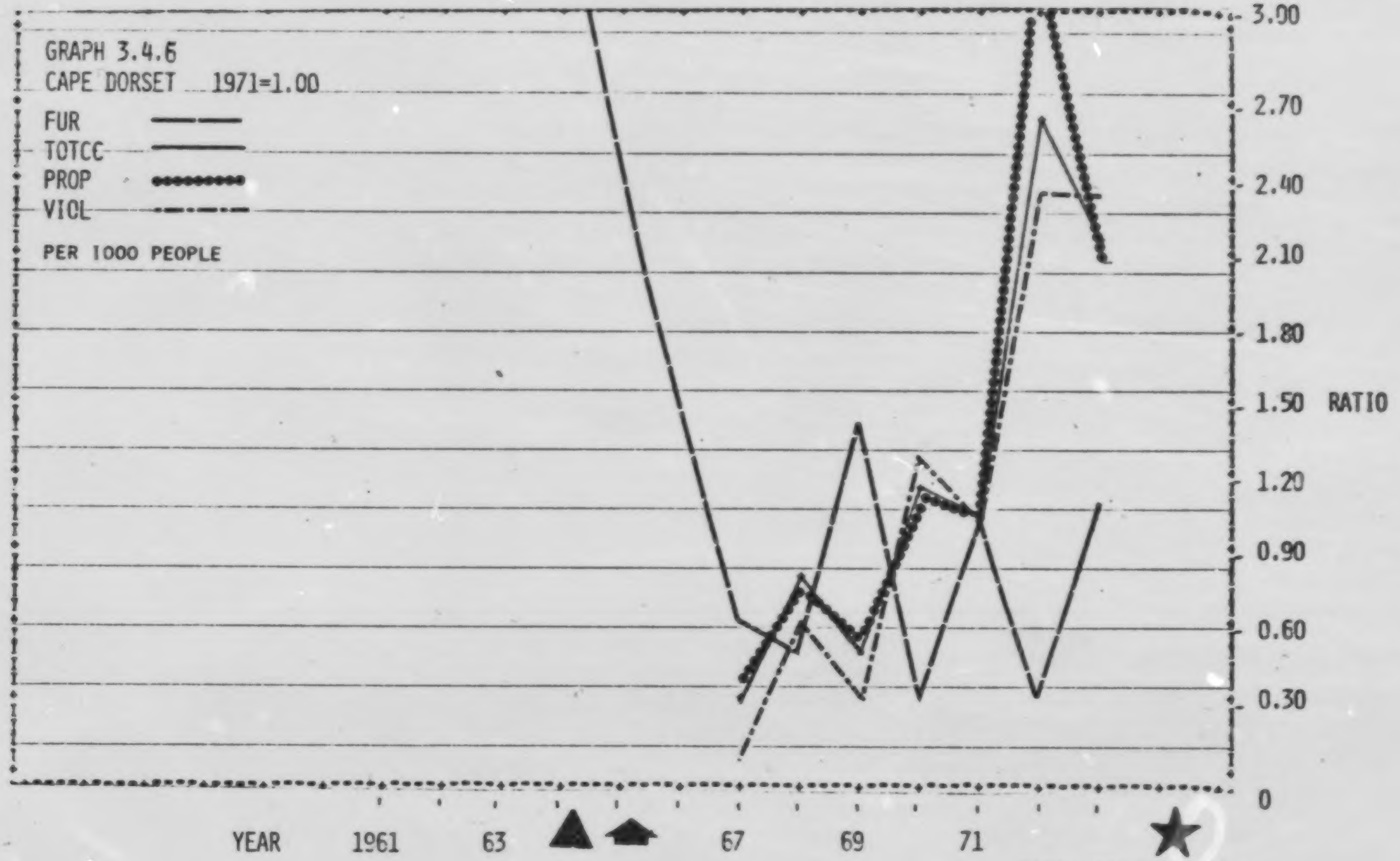
GRAPH 3.4.1
CAPE DORSET POPULATION IN THOUSANDS

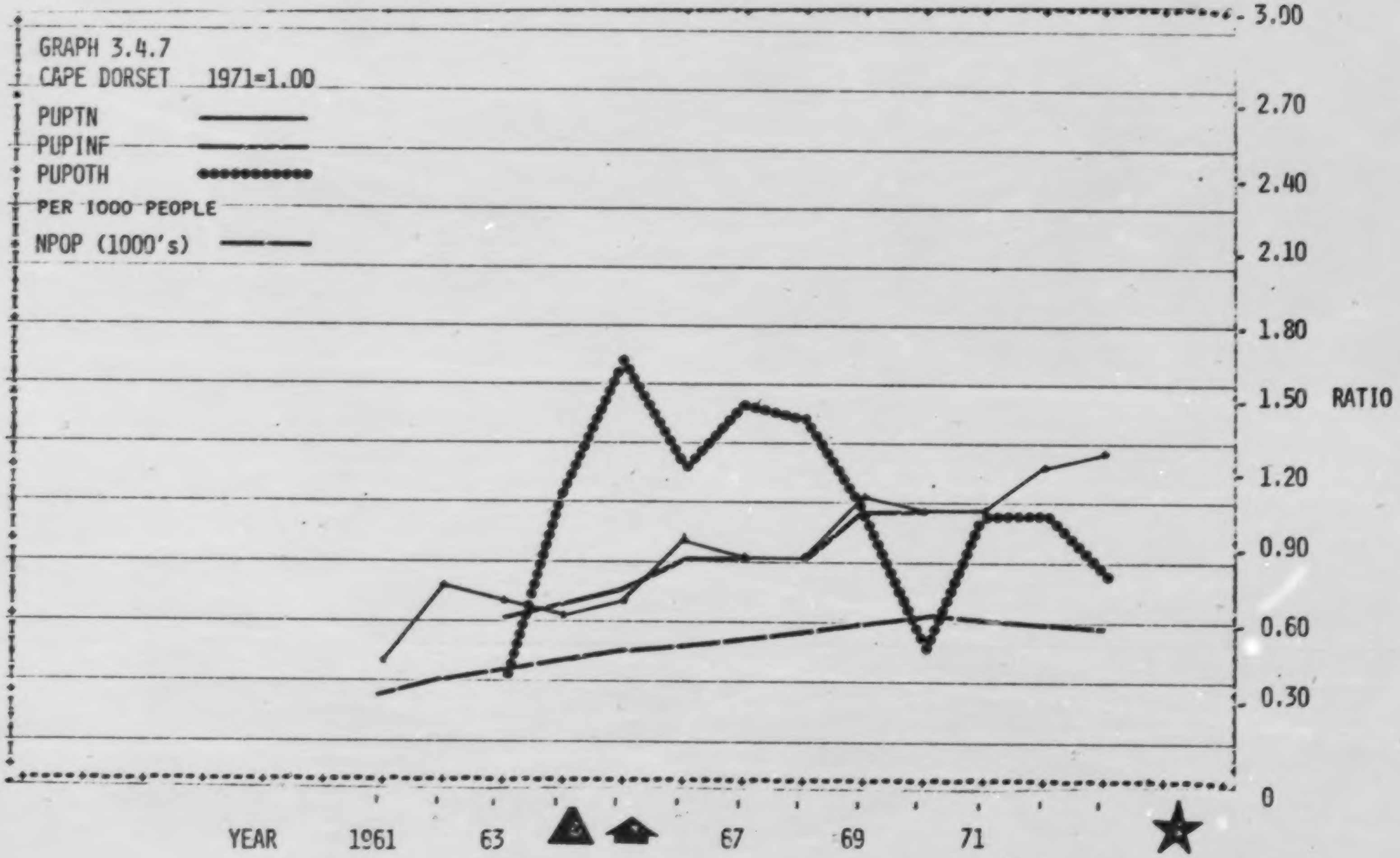

GRAPH 3.4.2
CAPE DORSET 1971=1.00
TPOP
NPOP/TPOP
3.00
2.70
2.40
2.10
1.80
1.50 RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71

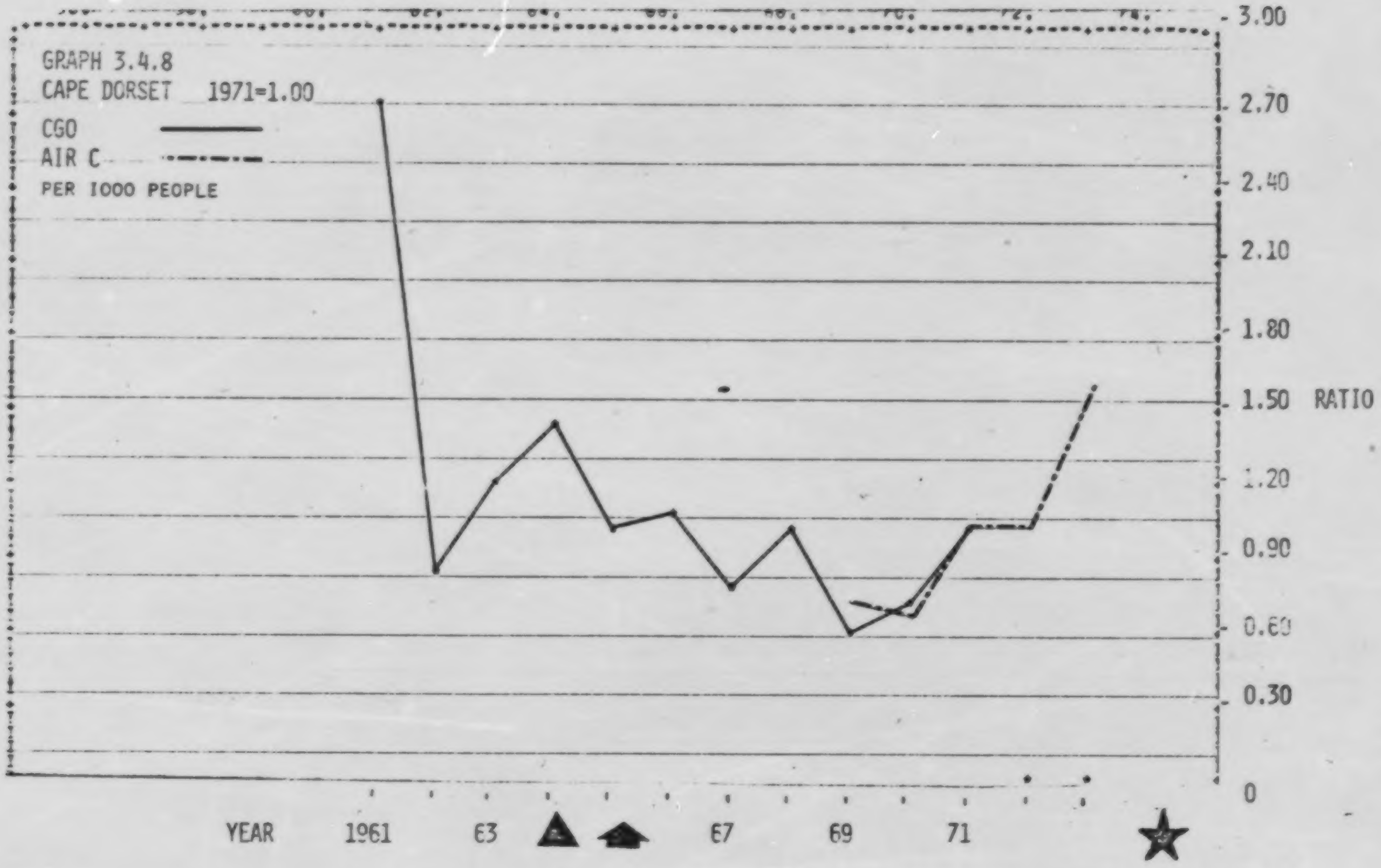

GRAPH 3.4.3
CAPE DORSET 1971=1.00
FOOD ACTUAL DOLLARS
CONSTANT (1961) DOLLARS
TELR
PER 1000 PEOPLE
TPOP
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71

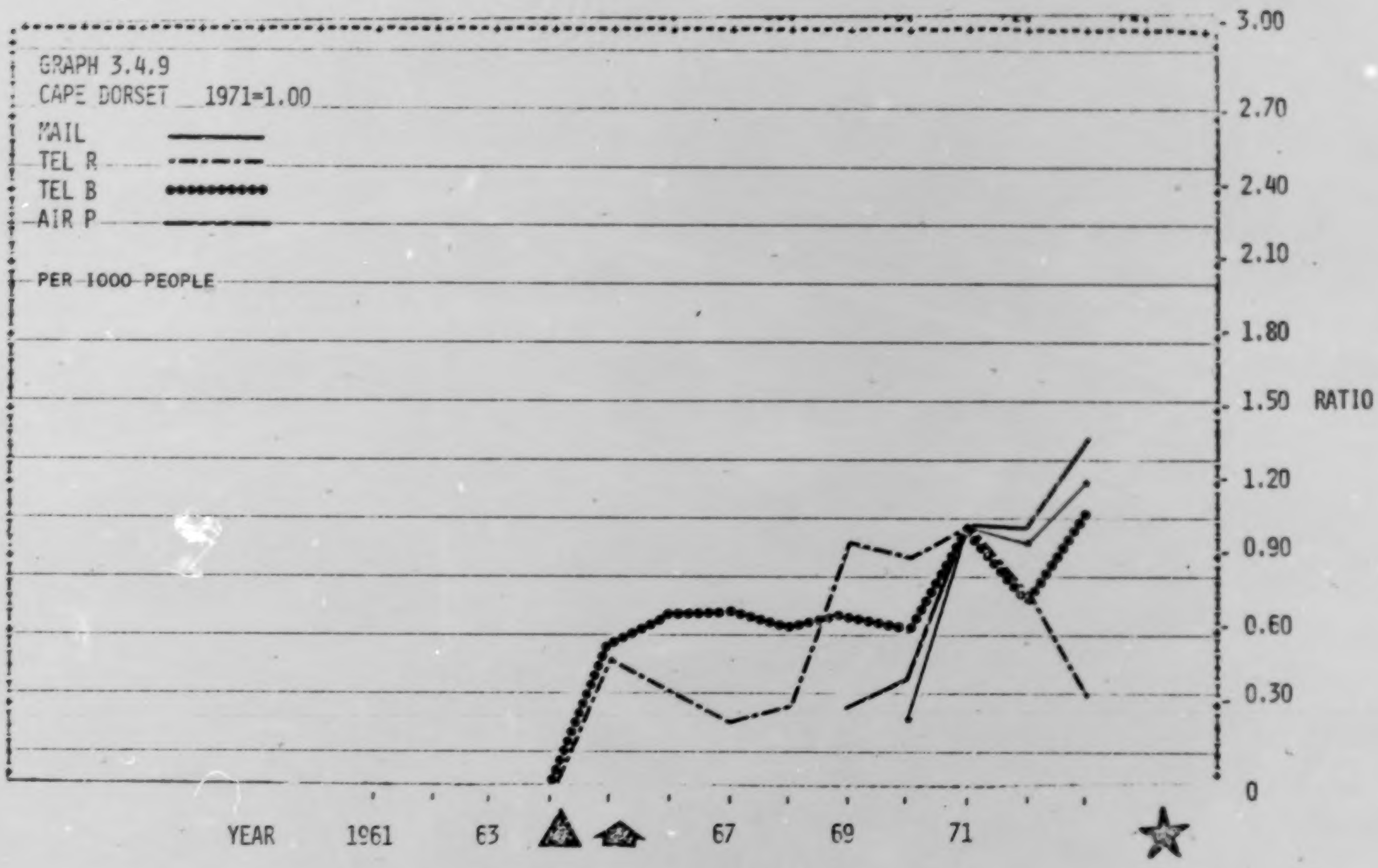

GRAPH 3.4.4
CAPE DORSET 1971=1.00
RET ACTUAL DOLLARS
CONSTANT (1961) DOLLARS
TEL B
TEL-R
PER 1000 PEOPLE
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71

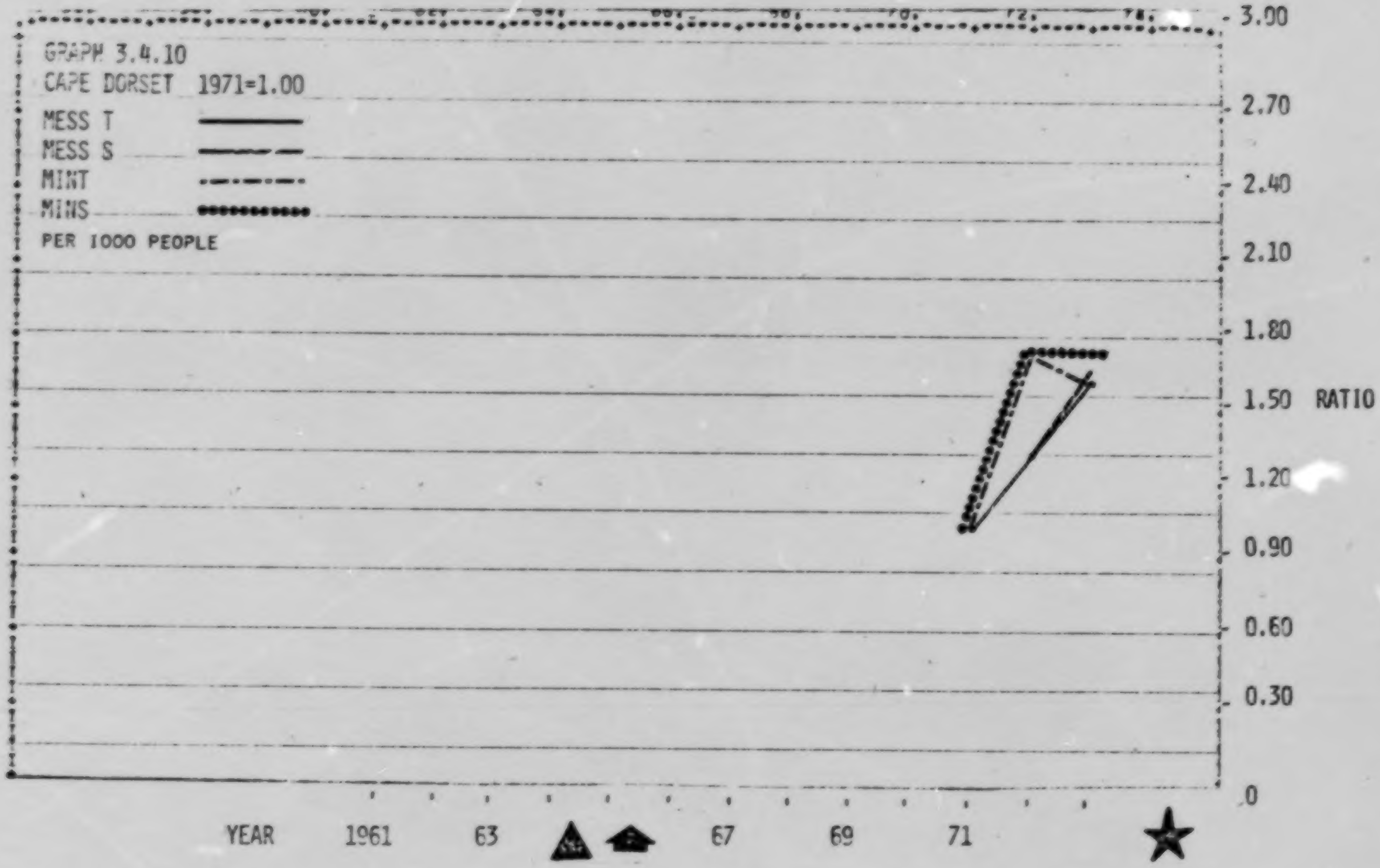

GRAPH 3.4.5
CAPE DORSET 1971=1.00
FUR
ACTUAL DOLLARS
CONSTANT (1961) DOLLARS
RET
PER 1000 PEOPLE
INC
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.4.6
CAPE DORSET 1971=1.00
FUR
TOTCC
PROP
VIOL
PER 1000 PEOPLE
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.4.7
CAPE DORSET 1971=1.00
PUPTN
PUPINF
PUPOTH
PER 1000 PEOPLE
NPOP (1000's)
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.4.8
CAPE DORSET 1971=1.00
CGO
AIR C
PER 1000 PEOPLE
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.4.9
CAPE DORSET 1971=1.00
MAIL
TEL R
TEL B
AIR P
PER 1000 PEOPLE
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.4.10
CAPE DORSET 1971=1.00
MESS T
MESS S
MINT
MINS
PER 1000 PEOPLE
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71

SECTION 5: CLYDE RIVER

Time-series data on Clyde River are presented in Graphs 3.5.1 to 3.5.9. Total population increases rapidly between 1961 and 1967, then levels off. A period of accelerated growth over 1966 and 1967 appears to be due to an influx of non-natives, since the proportion of natives in the total population drops concomitantly (Graph 3.5.2).

Food and retail sales follow a virtually flat line between 1963 and 1968, as one would expect, since the data is corrected for population changes (Graph 3.5.3). It is interesting that neither sales figure shows a large change related to the influx of non-natives, who might be expected to have different buying habits or be engaged in consummatory enterprises (business or government). After 1968, sales per 1,000 people increase rather spectacularly. There are no business or residential phones in Clyde River.

Clyde River also differs from the other communities in that fur purchases, despite fluctuations, remain at high levels (Graph 3.5.4). There is proportionately less of a decline from the 1964 peak than in the other communities; and in terms of purchases per 1,000 people, the 1964 peak in Clyde River is equal to the peak in Igloolik (compare Graph 3.3.5). In dollar terms, Clyde River increases its fur production three fold; in 1964, Clyde River accounted for 1/9 of the total production over the four communities, while in 1973 it accounted for 1/2 of total production. It seems that Clyde River has "taken up the slack" as the other communities moved away from the "traditional economy". Nonetheless, levels of family income and retail sales increase regardless of fluctuations in fur purchases, indicating that there are other sources of income in the community.

Crime shows wide fluctuations, generally increasing after 1973 (Graph 3.5.5). On a per capita basis, the crime level in Clyde River is twice that in Igloolik, but 1/3 to 1/5 of that in Frobisher. In this case, peaks and troughs in fur purchases are in phase with peaks and troughs in crime. However, reviving the alternative hypothesis of "cultural clash", we see a weak correspondence between crime levels and cultural juxtaposition as indicated by members of non-native pupils in the schools. There is evidence, in the data on fur purchases, that Clyde River persists in more traditional ways; it is conceivable that the arrival of alien customs is more abrasive in this community. The hump in non-native pupils between 1965 and 1967 coincides with the influx of non-natives noted earlier (Graph 3.5.2).

Here again, the rate of increase in total native pupils (and female native pupils) per 1,000 people is considerably greater than the rate of increase in native population (Graph 3.5.6). In contrast with other communities, sea cargo shows after 1967 a trend increasing almost parallel to the trend for air cargo (Graph 3.5.7). While both air passenger traffic and mail volume accelerate rapidly in the first years of regular service, only mail volume continues to grow in the typical pattern for new services; air travel drops off considerably in 1972-73 (Graph 3.5.8).

Telephone traffic shows very rapid growth in the number of calls, if not in their length (Graph 3.5.9). The 1973 values reach a maximum 7.5 times the 1971 base level. In this case the absolute number of outgoing calls is small (1/14 of the Frobisher value) since all calls must be made from the single HF-radiophone in the community. Nonetheless, substantial increases in the call frequency occur over the years studied, despite the fact that service remains technically identical over this period. One half of the outgoing calls in 1974 are made to other Arctic communities, the other half go into the national network in the south (Table 3.6.1).

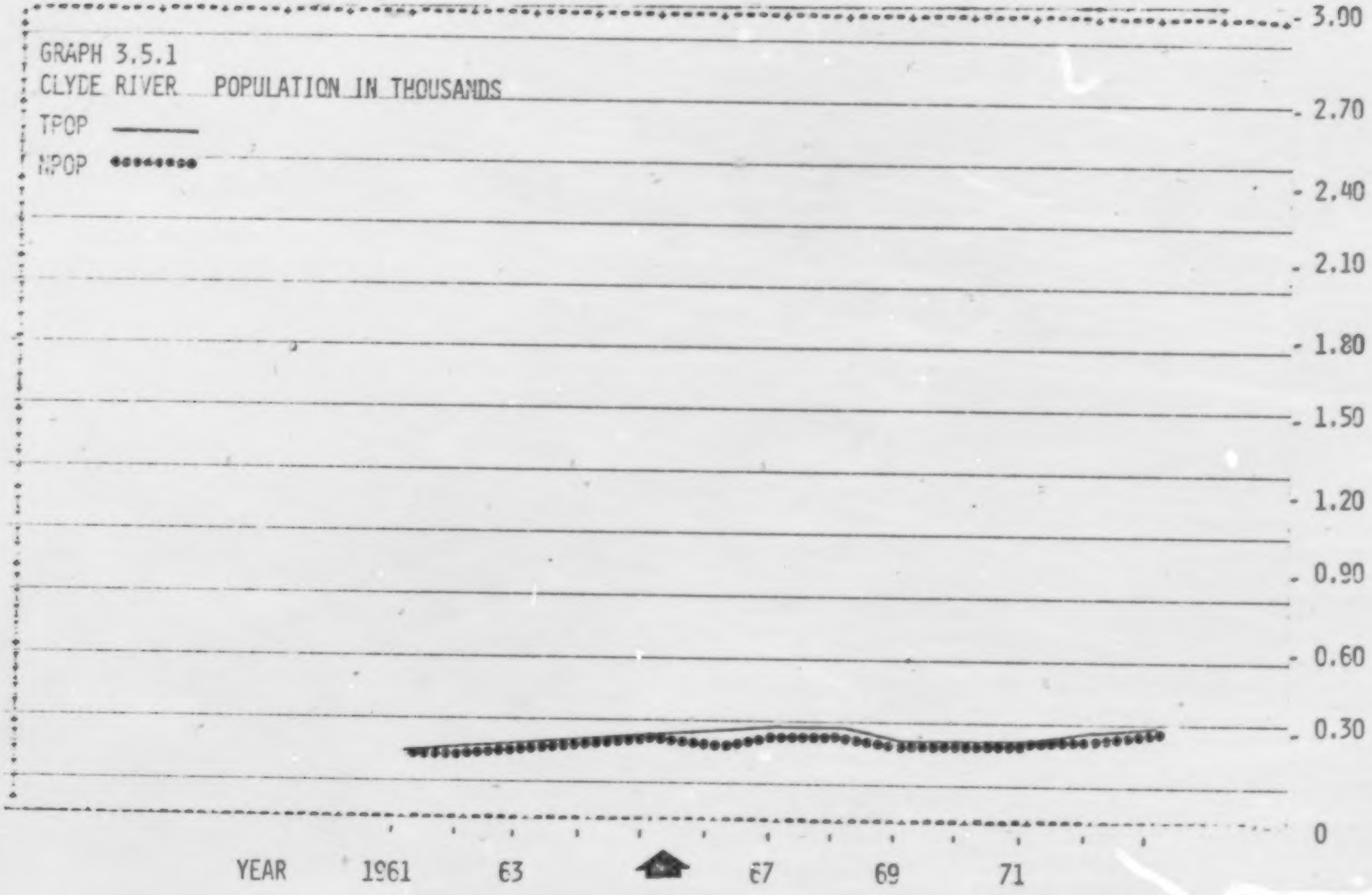
KEY

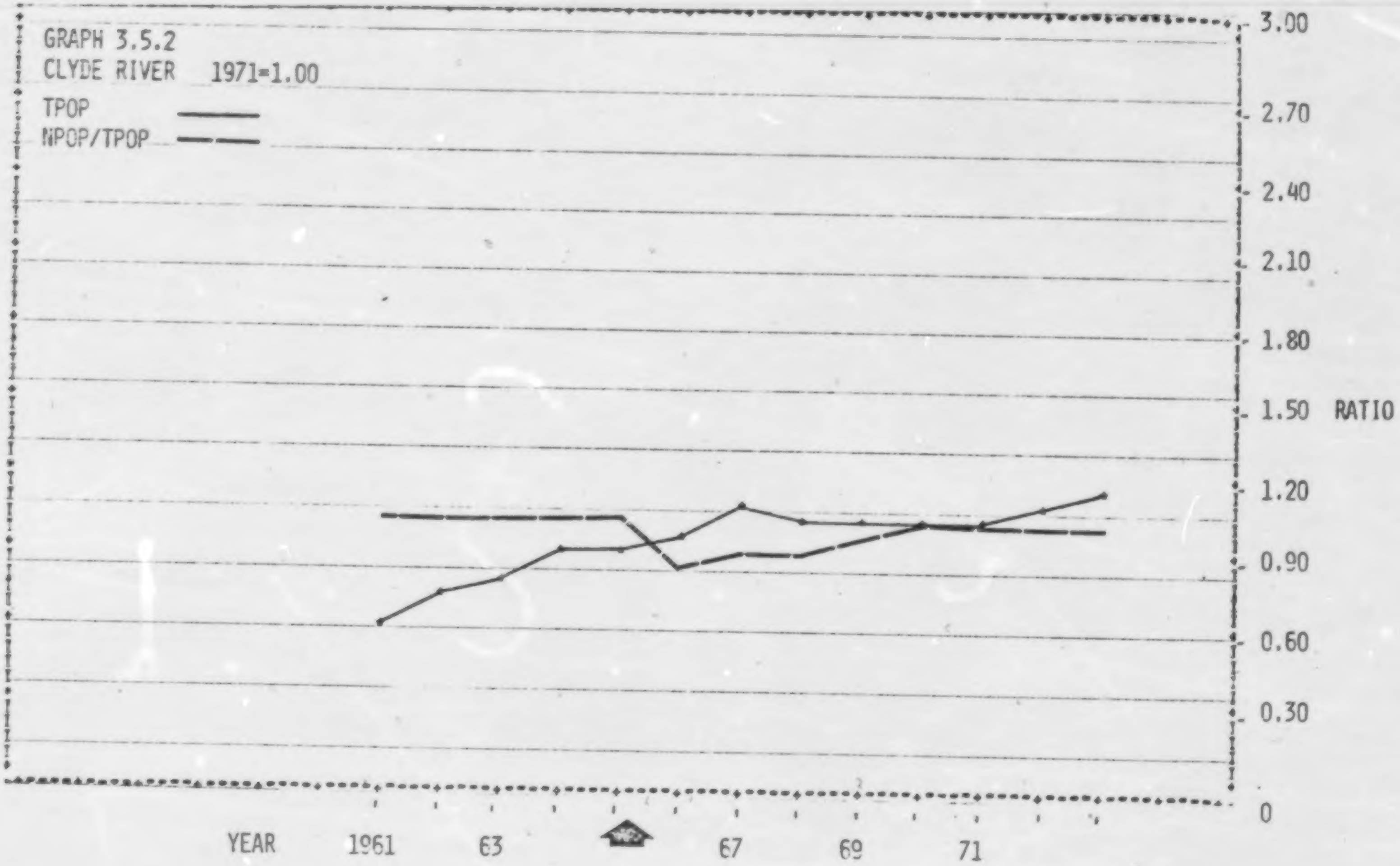
VARIABLES

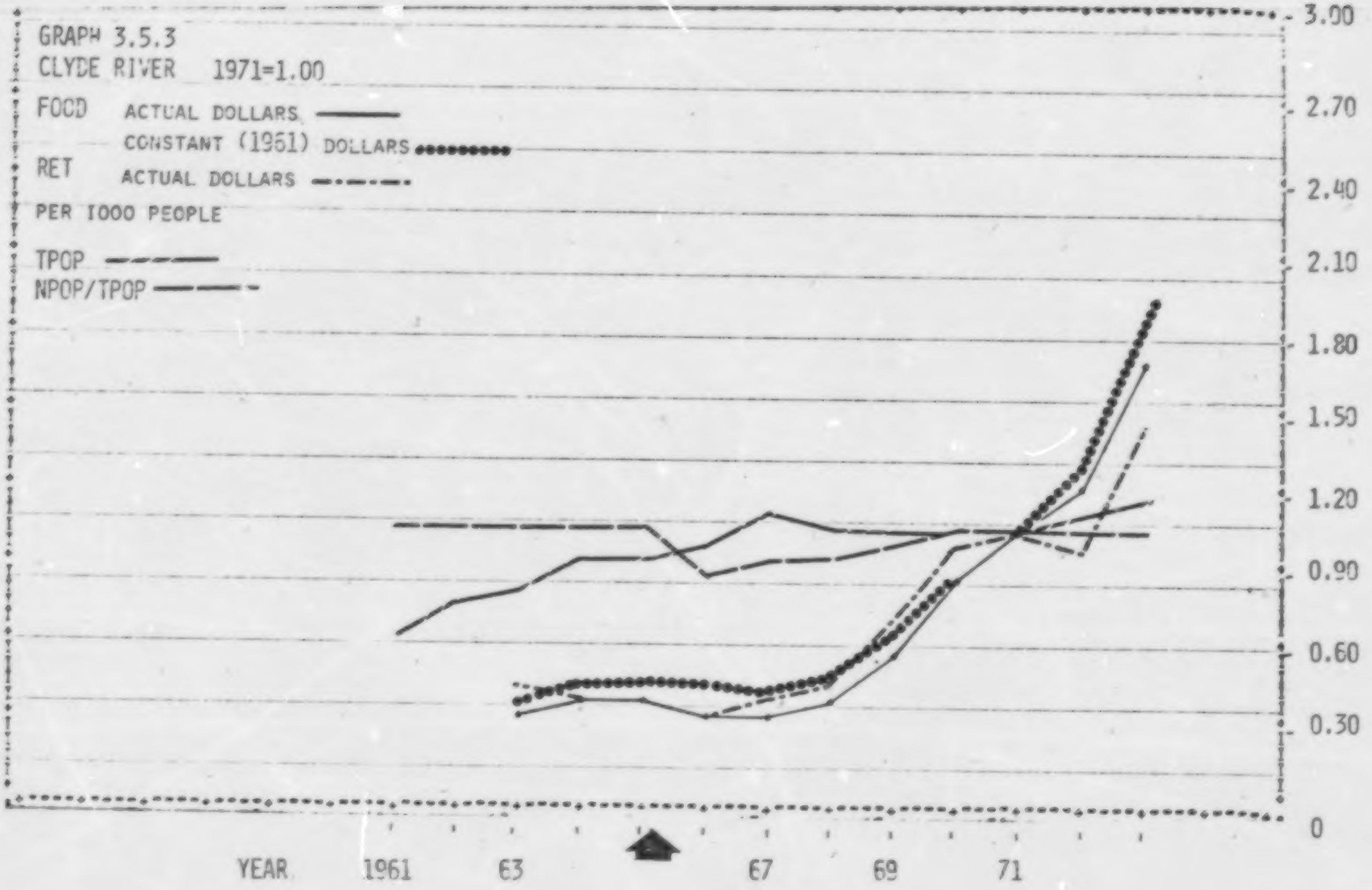
AIR C	Air cargo
AIR P	Air passengers
CGO	Sea cargo
FOOD	Food sales
FUR	Fur purchases
INC	Average family income
MAIL	Mail volume
MESS S	LD telephone calls into national network
MESS T	D telephone calls, total
MIN S	Duration of LD calls into nat. network
MIN T	Duration of LD calls, total
N POP	Native population
NN POP	Non-native population
PROP	Property crime
PUPINF	Pupils, native female
PUPF	Pupils, female (SL)
PUPOTH	Pupils, non-native
PUPT	Pupils, total (SL)
PUPTN	Pupils, total native
RET	Retail sales
TEL B	Business telephones
TEL R	Residential telephones
TEL T	Total telephones (SL)
TOT CC	Total criminal offences
TPOP	Total population
VIOL	Violent crime

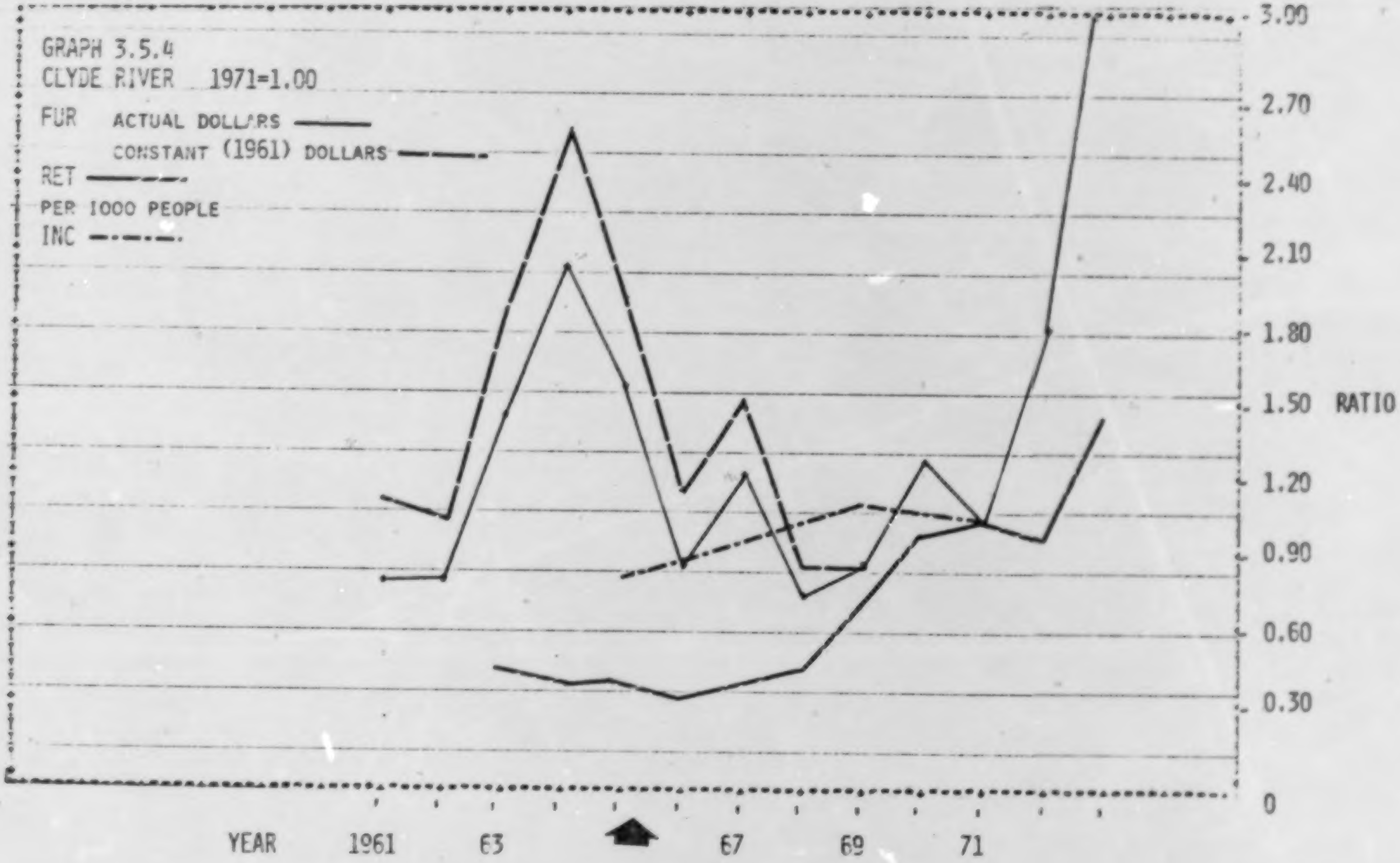
SYMBOLS

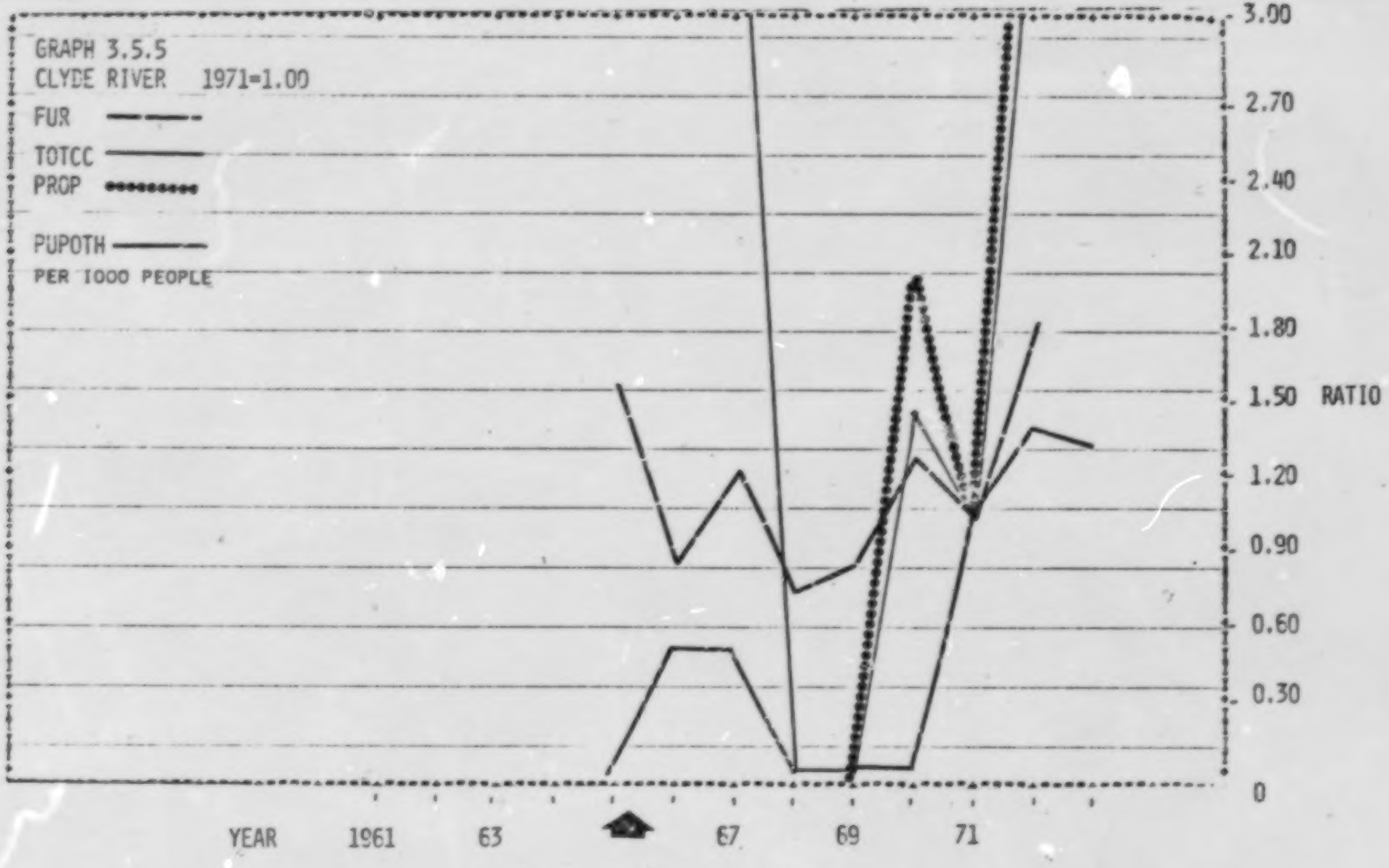
▲	Start of dial telephone service, following upgrading of old exchange, or new installation.
⌂	Start of Federal Rental Housing Program.
★	Start of satellite communications service via Anik.

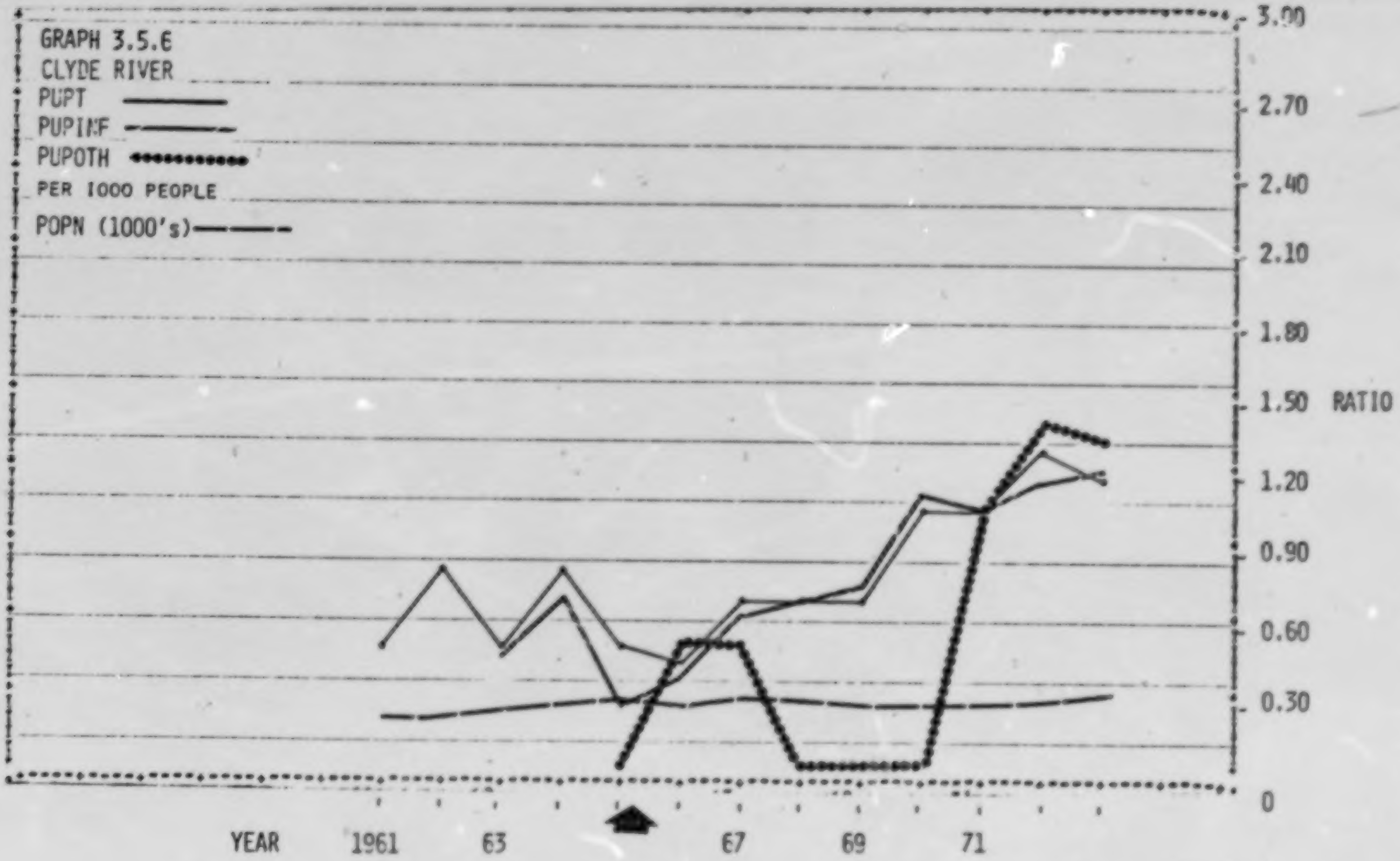

GRAPH 3.5.1
CLYDE RIVER POPULATION IN THOUSANDS
TPOP
NPOP ●●●●●●●●
3.00
2.70
2.40
2.10
1.80
1.50
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71

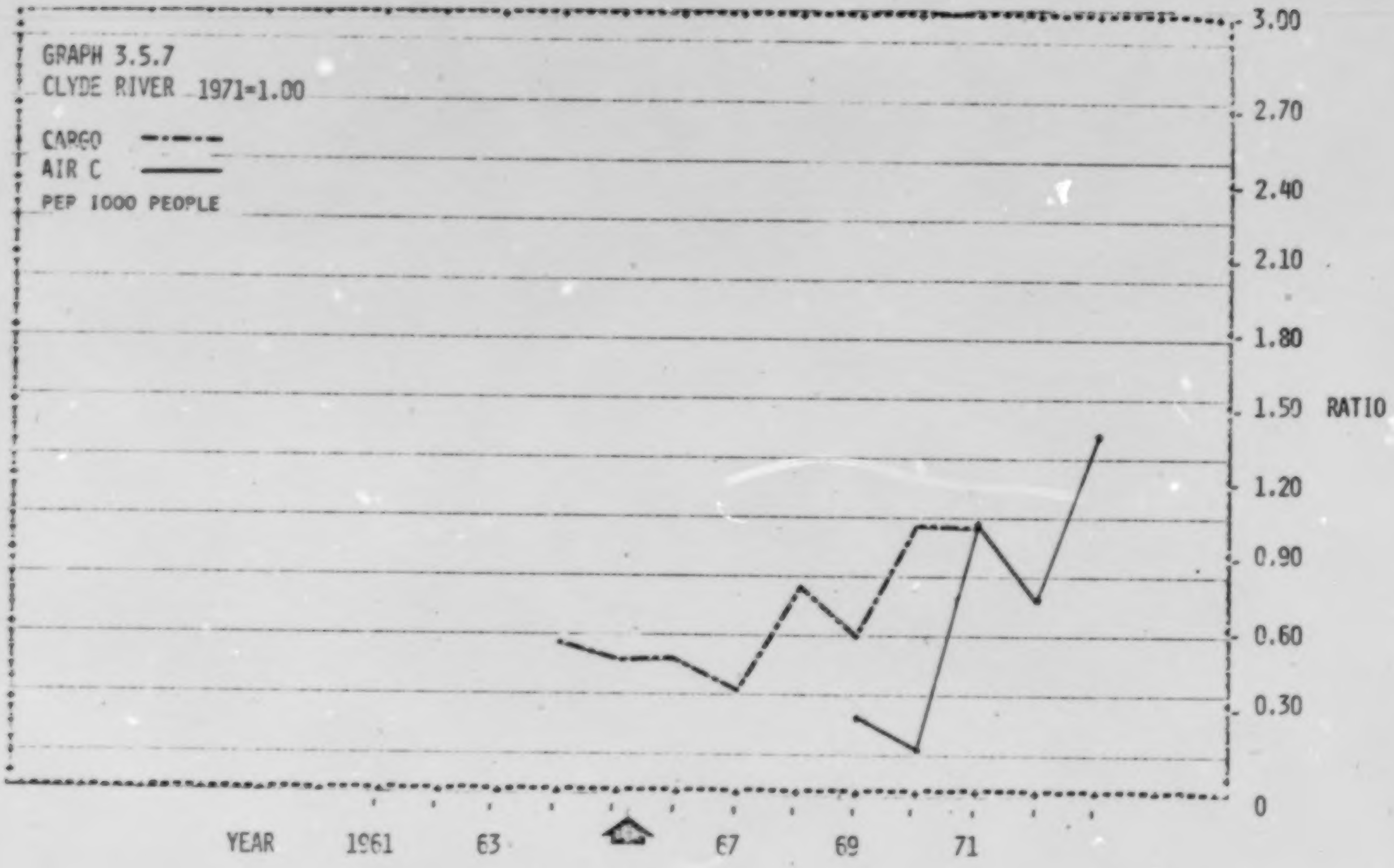

GRAPH 3.5.2
CLYDE RIVER 1971=1.00
TPOP
NPOP/TPOP
3.00
2.70
2.40
2.10
1.80
1.50 RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71

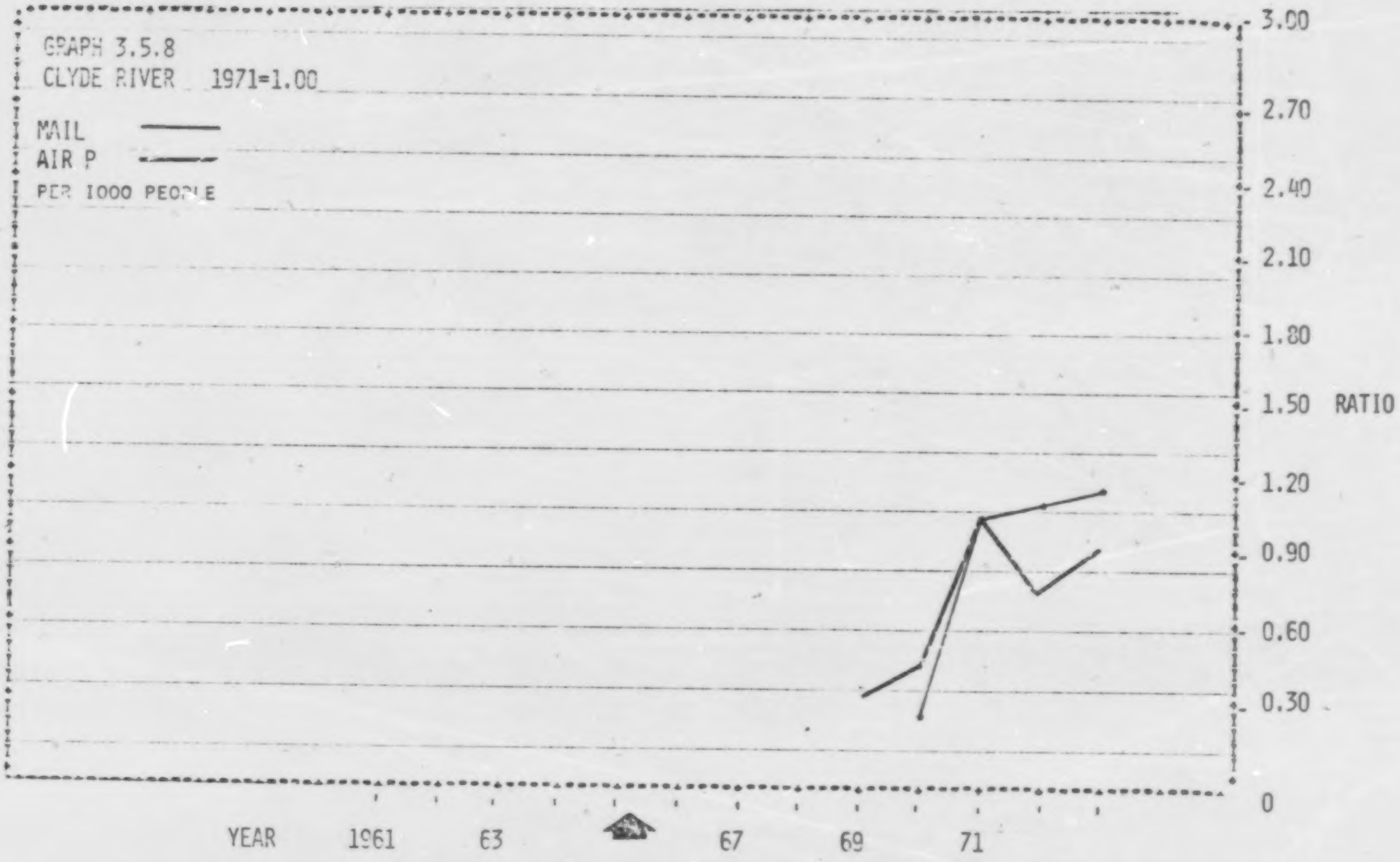

GRAPH 3.5.3
CLYDE RIVER 1971=1.00
FOOD ACTUAL DOLLARS
CONSTANT (1961) DOLLARS
RET ACTUAL DOLLARS
PER 1000 PEOPLE
TPOP
NPOP/TPOP
3.00
2.70
2.40
2.10
1.80
1.50
1.20
0.90
0.60
0.30
0
RATIO
YEAR
1961
63
67
69
71

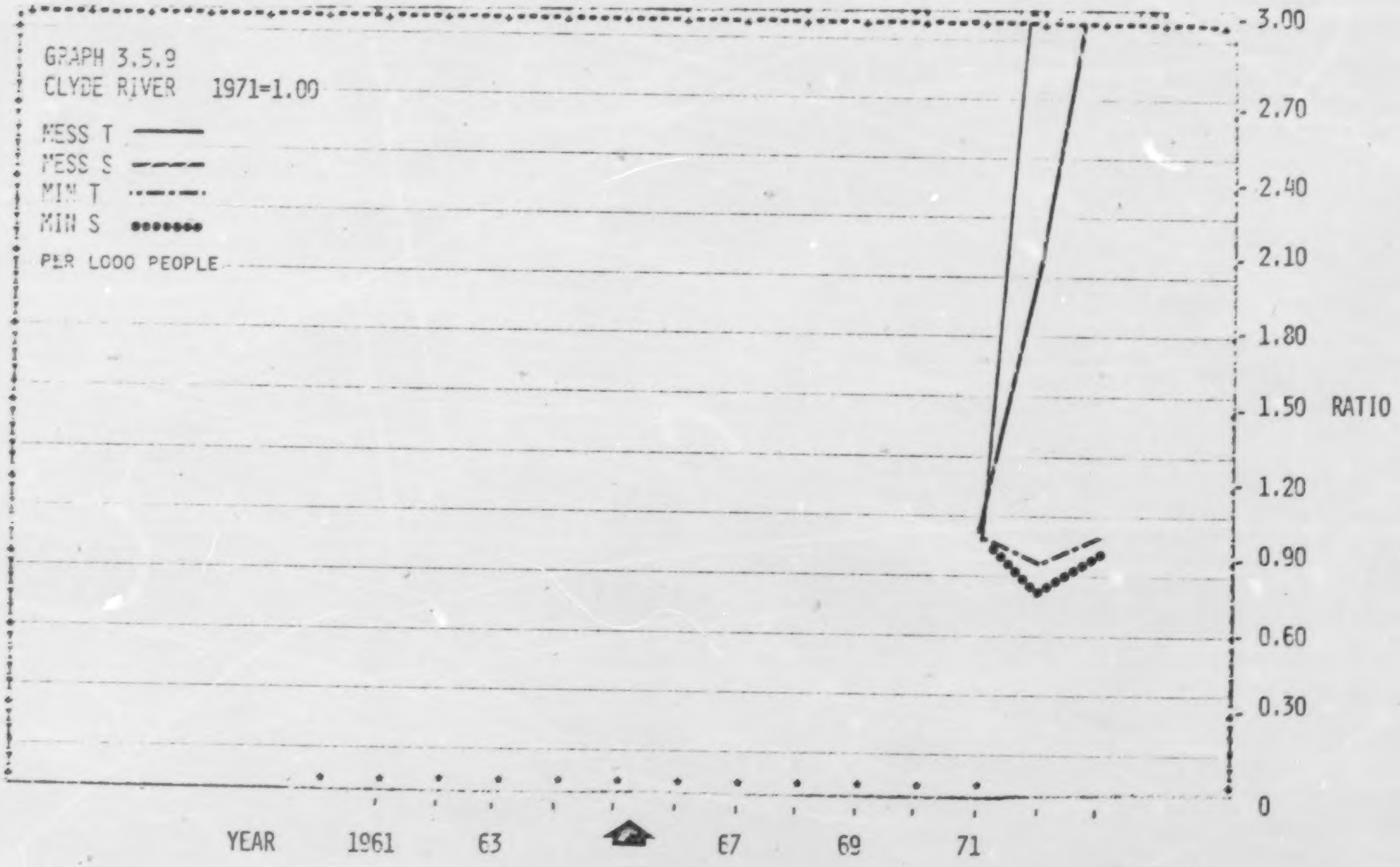
GRAPH 3.5.4
CLYDE RIVER 1971=1.00
FUR ACTUAL DOLLARS
CONSTANT (1961) DOLLARS
RET
PER 1000 PEOPLE
INC
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.5.5
CLYDE RIVER 1971=1.00
FUR
TOTCC
PROP
PUPOTH
PER 1000 PEOPLE
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.5.6
CLYDE RIVER
PUPT
PUPINF
PUPOTH
PER 1000 PEOPLE
POPN (1000's)
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.5.7
CLYDE RIVER 1971=1.00
CARGO
AIR C
PEP 1000 PEOPLE
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.5.8
CLYDE RIVER 1971=1.00
MAIL
AIR P
PER 1000 PEOPLE
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.5.9
CLYDE RIVER 1971=1.00
MESS T
MESS S
MIN T
MIN S
PER 1000 PEOPLE
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71

SECTION 6: COMPARISONS ACROSS COMMUNITIES

This final section presents a series of graphs in which the five communities are compared, variable by variable (see Graphs 3.6.1 to 3.6.7). For the sake of brevity, a sample of seven variables, five of them from the communications sector, have been selected.

Graph 3.6.1 presents comparative data on food sales. The trends for Igloolik and Cape Dorset are similar to one another, and very close to the trend in the control community (Sioux Lookout). Clyde River makes a slower start, but picks up the accelerating trend after 1967. Frobisher Bay shows the only major deviation from the norm, between 1967 and 1970. The high point in this deviation has been attributed earlier to "boom" conditions surrounding the growth of regional government headquarters. Except for this anomaly, the five communities seem to be behaving similarly with respect to basic consumption.

However, on the production side, the traditional economy does not perform similarly in all four Arctic communities (Graph 3.6. On one hand, Frobisher Bay, Igloolik, and Cape Dorset show sharp declines in fur production from the peak years of 1963-1965; on the other hand, Clyde River shows a relatively more stable output, and a rapid growth in production after 1971. In Clyde River, the peak in 1973 greatly exceeds the 1964 peak, which in terms of fur dollars per 1,000 people, matched the peak in other communities. We see, then, that the "traditional economy" remains a much stronger source of income in Clyde River. One can expect that persistence of this traditional element will influence other aspects of life in this community.

There is even more variation in the number of residential telephones installed in each community (Graph 3.6.3). Sioux Lookout shows a moderately increasing trend, reaching 437 residential telephones per 1,000 people in 1973 (see Table 3.6.1). This is what we might expect in a relatively mature community, where the telephone has been available for decades.
The number of residential phones begins its increase a full year

VARIABLE	COMMUNITY				
	SL	FB	IG	CD	CL
AIRP (1973) Ratio	-	3.4	1.3	2	1
MAIL (1973) Pounds	910	290	250	380	410
TEL R (1973) Telephones	437	249	131	69	-
TEL B (1973) Telephones	239	207	66	40	-
MESS T (1974) Ratio	13.75	8.50	3.81	4.20	1
MESS S (1974)% of Mess T	100%	83%	61%	53%	52%
MESS S (1972)% of Mess T	100%	95%	61%	54%	54%

Table 3.6.1 Comparative data on communications variables for the five communities. All values are per 1,000 people, except for air passengers (AIR P) and total messages (MESS T), which are expressed as ratios of the Clyde River value. Southbound messages (MESS S) are expressed as percentages of total messages for each community.

after the conversion from operator to dial-exchange in late 1965.

Similarly, there has been a local exchange in Frobisher Bay since the mid-fifties; and so we see that the number of telephones per 1,000 people declines slightly until 2 years after the conversion to a dial-exchange in mid-1964. Growth thereafter parallels growth in Sioux Lookout, except that the trend peaks in the "boom" year of 1970, and levels off in 1971-73. At that point, the density of residential phones (249 per 1,000 people) is well below the density (437) in Sioux Lookout.

On the other hand, the communities which have only rudimentary phone service (public HF-phones) prior to the introduction of local exchanges in late-1964 show more rapid changes than Sioux Lookout. After an initial leap in the first year in which telephones are available the trends for Igloolik rises very uniformly from 1966 onward, to a density of 131 phones per 1,000 people in 1973. This is well below the apparently stabilising value in Frobisher. In Cape Dorset, change is erratic, with a rapid increase at the outset, and again in 1969, and rapid decreases in 1966-67 and 1972-73. The density in 1973 (69 residential phones per 1,000 people) is well below the Igloolik value. In 1973, service in Igloolik was upgraded with the installation of an Anik ground station; Cape Dorset did not receive this level of service until late 1974. It is conceivable that the difference between the two trends here reflects not only the difference in actual service in 1973, but also the different expectations in years prior to '73 when it was known that Anik would reach Igloolik before it would reach Cape Dorset.

In the case of business telephones, the growth rates in the Arctic communities are closer to the rate in Sioux Lookout (Graph 3.6.4). The Frobisher trend does not peak in 1970, but flattens out from that point at 207 telephones per 1,000 people (very close to the Sioux Lookout value). The trend for Igloolik continues to accelerate after 1970, reaching a level in 1973 which is well below that in Frobisher. The figures for Cape Dorset are erratic, but perhaps less so than the figures for residential telephones. Generally, one would expect the business subscriptions to be less vulnerable to sudden change than the residential subscriptions.

Mail volume per 1,000 people shows a moderate increase in the control community (Graph 3.6.5). Although a similar trend appears in the Frobisher data after 1969, the 1973 value (290 lbs. per 1,000 people) is well below the level in Sioux Lookout (910 lbs.). However, since mail reaches Sioux Lookout by train rather than plane there are probably more heavy packages in the post. For the other Arctic sites, regular mail service commences in 1970, and volume rapidly expands. Interestingly, the trends for Cape Dorset and Clyde River appear to level off very quickly, but at a level much higher (380 and 410 lbs. per 1,000 people) than the apparent plateau in Frobisher. Despite continued growth at the original high rates, volume in Igloolik is only 250 lbs. per 1,000 people in 1973.

All the Arctic communities show accelerating rates of air travel after the inception of scheduled service. If the 1970 peak attributed to "boom" conditions in Frobisher is excluded, growth is nearly uniform in all communities, with a slump of varying degrees in 1972. In this case, actual levels of traffic attained by 1973 seem to be influenced by travel distance and the quality of service. Frobisher can be reached daily by jet, Cape Dorset is only about 200 miles from Frobisher; Igloolik and Clyde River on the other hand are several hours distant from Frobisher, and the "schedule" is subject to sudden modification, according to weather conditions.

Finally, Graph 3.6.7 presents comparative data on total long-distance calls per 1,000 people (note the change in scale on the ordinate). The flatness of the Sioux Lookout trend suggests that an asymptotic level has been reached. All other trends indicate continued growth, especially in the case of Clyde River and Igloolik. The relative levels of traffic in 1974 (see Table 3.6.1) support this suggestion. It is interesting that with the advent of Anik, long-distance traffic grows at a phenomenal rate in Igloolik, only to approach the level in Cape Dorset, which does not enjoy Anik service and has fewer telephones. At the same time, traffic levels increase very rapidly in Clyde River (but to a relatively low level per 1,000 people; see Table 3.6.1)even in the absence of a local exchange or Anik Service. It is conceivable that technological advance in the overall telephone network which brings more people into the system stimulates traffic even in those communities not directly affected by the technological change.

NOTES ON THE GRAPHS - SECTION 6

The graphs in this section have been prepared under the following conventions:

(1) Each graph presents the data on one variable for each of the five communities (where available).

(2) All data is presented as a ratio of the 1971 value for each variable (i.e. the 1971 value = 1.00).

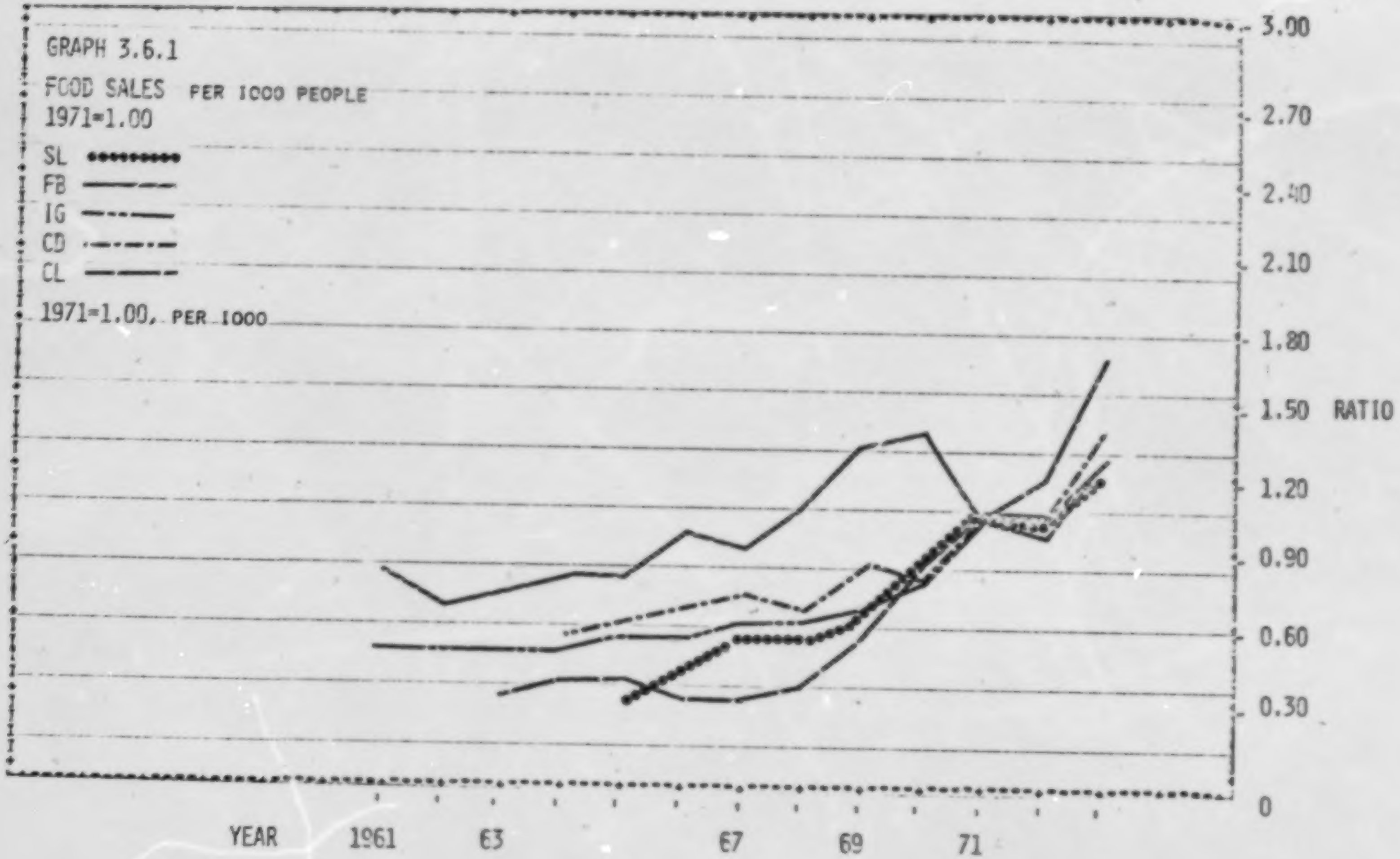
(3) All variables are standardised by dividing the raw value for each year by the appropriate population in thousands for that year.

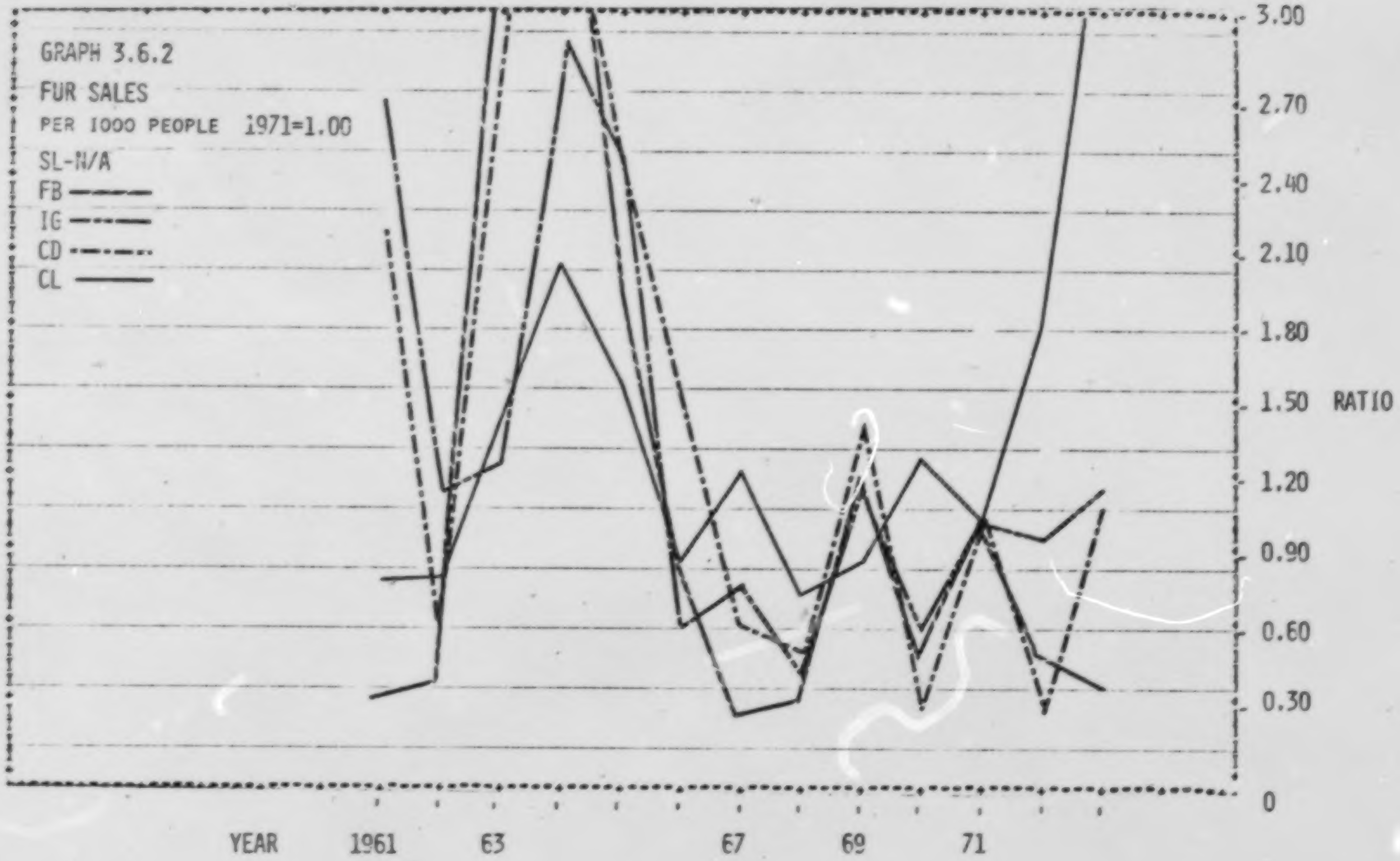
(4) Where several functions follow the same path, only one line is shown.

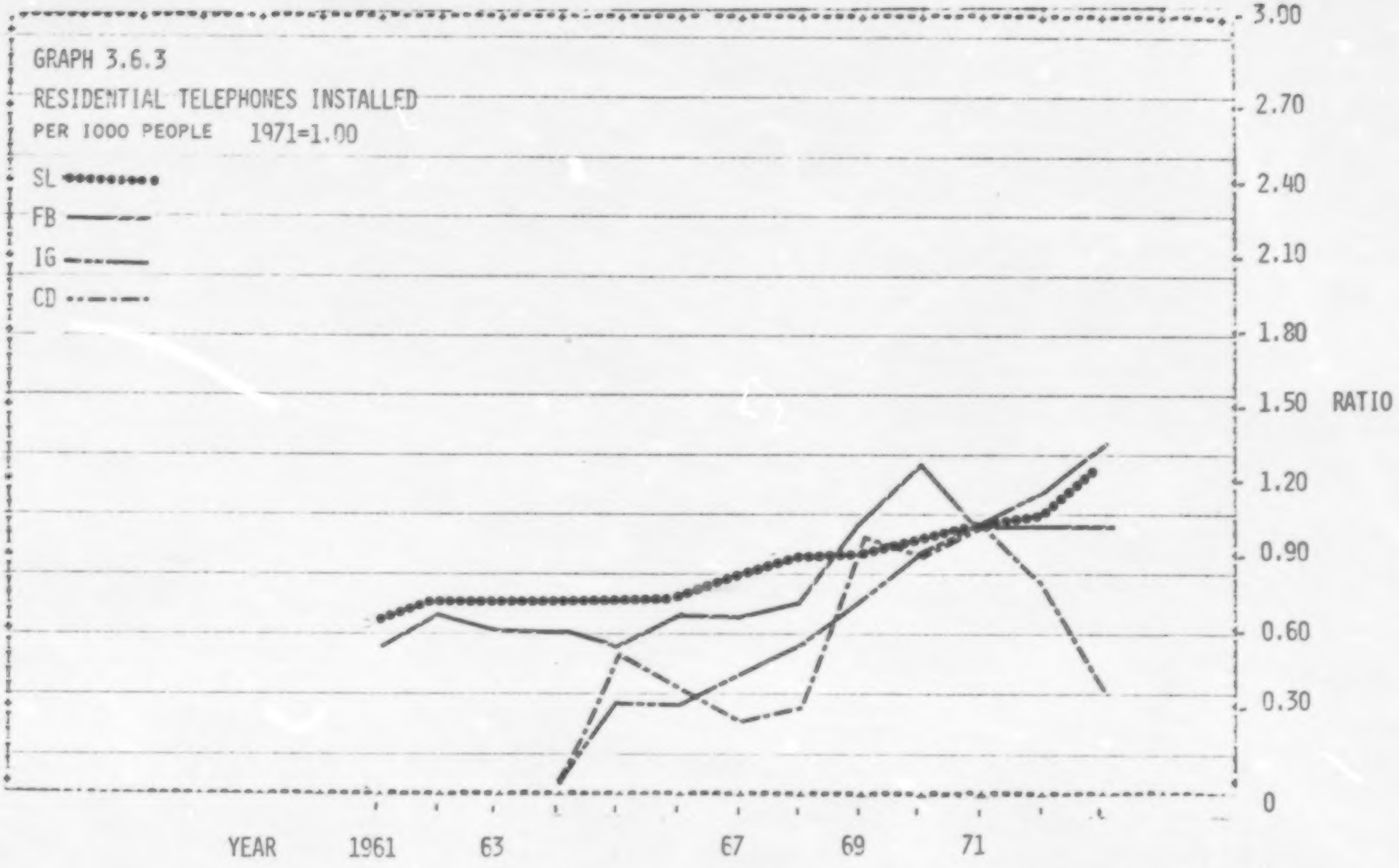
(5) Only actual dollar values are shown for sales and purchase variables.

ABBREVIATIONS

CD	Cape Dorset
CL	Clyde River
FB	Frobisher Bay
IG	Igloolik
SL	Sioux Lookout

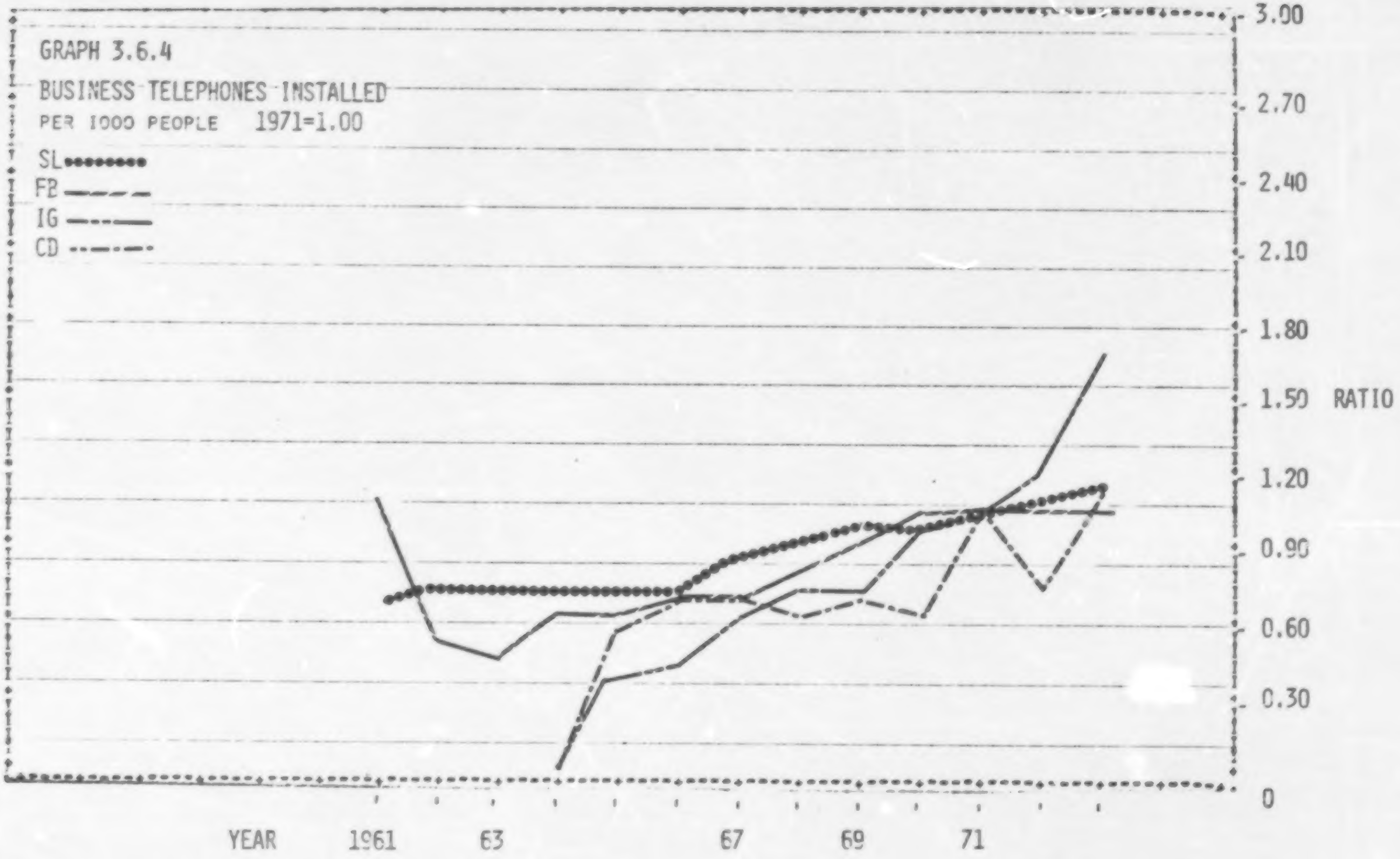

GRAPH 3.6.1
FOOD SALES PER 1000 PEOPLE
1971=1.00
SL ●●●●●●●●●●
FB
IG
CD
CL
1971=1.00, PER 1000
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71

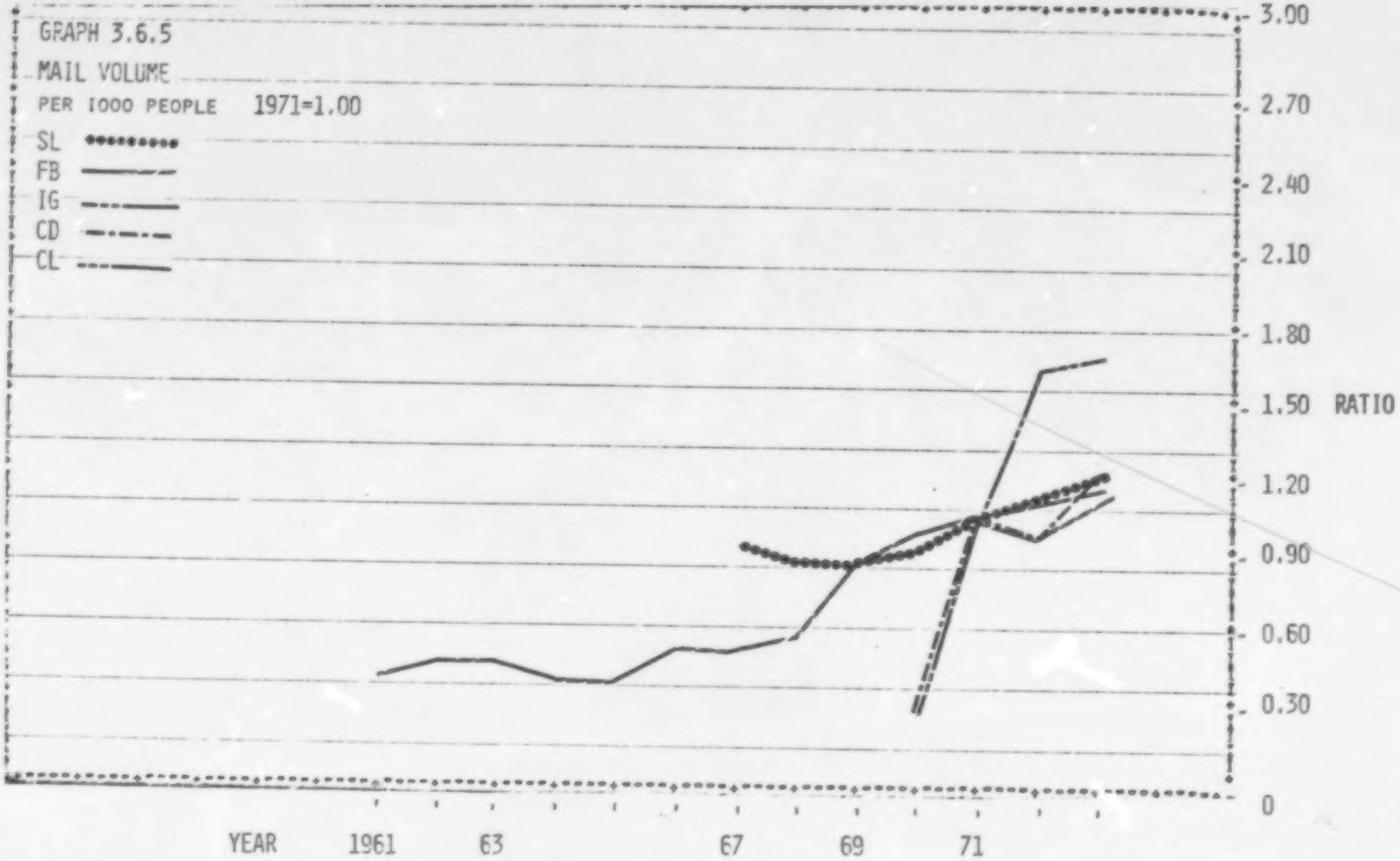

GRAPH 3.6.2
FUR SALES
PER 1000 PEOPLE 1971=1.00
SL-N/A
FB
IG
CD
CL
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71

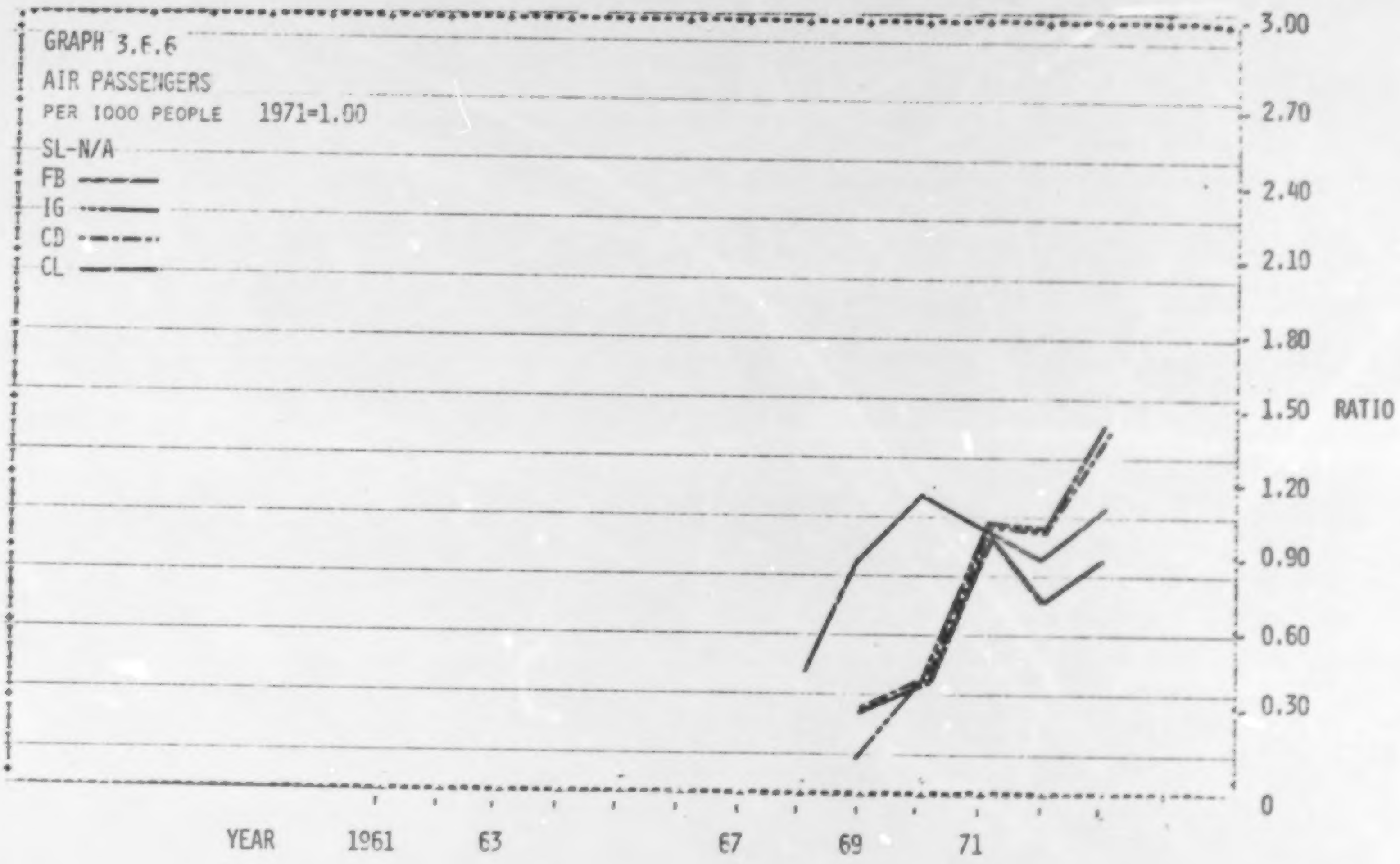


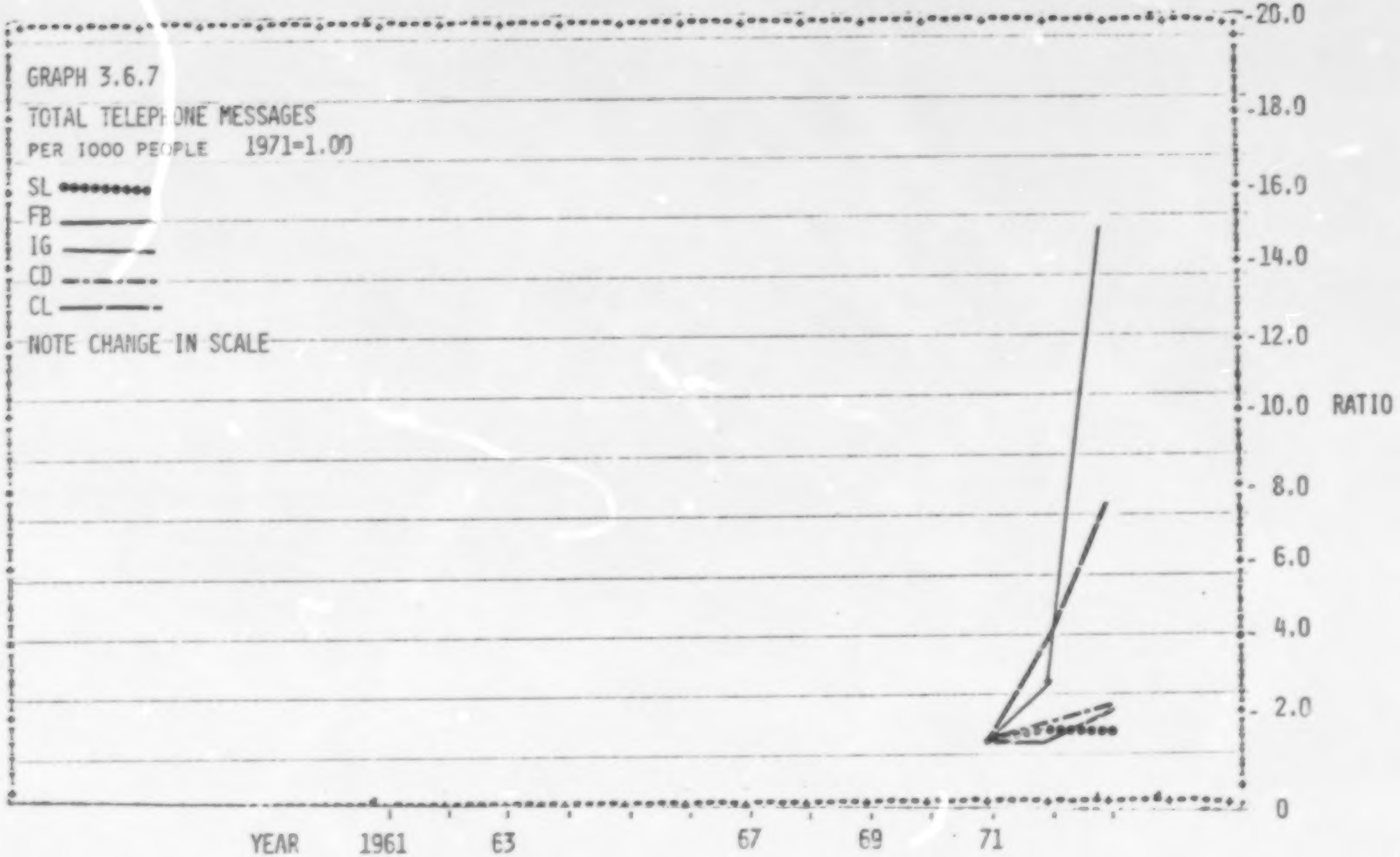
GRAPH 3.6.3

RESIDENTIAL TELEPHONES INSTALLED PER 1000 PEOPLE 1971=1.00


GRAPH 3.6.4
BUSINESS TELEPHONES INSTALLED
PER 1000 PEOPLE 1971=1.00
SL ●●●●●●●●●
FB — — —
IG —·—·——
CD ·-·—·—·
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.6.5
MAIL VOLUME
PER 1000 PEOPLE 1971=1.00
SL ●●●●●●●●●
FB ——— — —
IG —·-———
CD —·—·—
CL ---———
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.6.6
AIR PASSENGERS
PER 1000 PEOPLE 1971=1.00
SL-N/A
FB
IG
CD
CL
3.00
2.70
2.40
2.10
1.80
1.50
RATIO
1.20
0.90
0.60
0.30
0
YEAR
1961
63
67
69
71


GRAPH 3.6.7
TOTAL TELEPHONE MESSAGES
PER 1000 PEOPLE 1971=1.00
SL ●●●●●●●●●
FB ———
IG ———
CD -·-·-
CL — — -
NOTE CHANGE IN SCALE
20.0
18.0
16.0
14.0
12.0
10.0
RATIO
8.0
6.0
4.0
2.0
0
YEAR
1961
63
67
69
71

SECTION 7: INTERVIEW DATA

Interviews were conducted in households picked at random in Igloolik, Cape Dorset, and Clyde River. In these communities, 50, 15, and 28 households (see Table 3.7.1) were surveyed, yielding data on 205 variables (see interview protocol, Appendix B). This represents 65%, 20%, and 65% of all households, respectively. For our purposes here, only the information obtained from the adults in each of these households is reported. Furthermore, the discussion focuses on the following variables: TV exposure; telephone subscriptions; ownership of radio, record player, and tape recorder; frequency of travel, HF calls, local telephone calls, and long distance calls; readership for newspapers and magazines; library usage; movie attendance; and preference for telecommunications media. These variables were selected in order to relate telephone usage to use of other communications media and to travel.

Looking first at telephone subscriptions, let us note that 28 adults in our sample of 93 cannot have telephones, since there is no local exchange in Clyde River. Of the 65 living where telephones are available, 45 (69%) are subscribers.

Summing over all three communities, 67% of the respondents (i.e. 55 out of 82 answering the question) prefer to visit friends and relatives in other settlements via telephone, rather than via letter or travel. Even though telephone service is minimal in Clyde River, 74% of the respondents in that community prefer to visit by telephone. In Igloolik and Cape Dorset, the figures are 67% and 50%. Visiting by letter is preferred by about 25% of all respondents (about 12% in Clyde, 30% in Igloolik, and 33% in Cape Dorset). Travel is the choice of only about 8% of all respondents - most of them in Clyde River and Cape Dorset.

The telephone is unanimously preferred to the HF radiophone. Looking at telephone usage, 75% of the respondents made calls "today or yesterday" (where local calling is possible); another 12% made calls within the past year. Of those who answered the question on long distance (LD) calling (52 out of 93), about

	IG	CD	CL
NUMBER	50	15	28
% OF TOTAL HOUSEHOLDS	65%	20%	65%
NATIVE	37	15	22
NON-NATIVE	12	0	6
MALE	25	5	18

Table 3.7.1 Characteristics of the interview sample (adults only).

25% placed a call "today or yesterday," and another 66% called within the past year. The remaining 9% have never placed a LD call. Half of all those who did not answer this question live in Clyde River. About 93% of the respondents in Cape Dorset, and 82% of those in Igloolik have made LD calls at one time or another.

Of the 55 persons who answered the question on when they last received a long-distance call , only 6% received such a call "today or yesterday." However, 90% were called from outside at one time or another. In other words, the number getting calls is about the same as the number sending calls out - but the "in-calls" are generally more distant in time. This sample therefore suggests that more of the connecting calls are initiated inside these outlying communities than outside.

It is interesting to examine the relation of the telephone variables to other communication variables. Generally, respondents who prefer the telephone to other modes of "visiting" have seen television somewhere (mostly Frobisher); they possess tape recorders and record players; and read newspapers at least once a week. On the other hand, those preferring the telephone did not attend a movie "recently," do not read at least one magazine weekly, and do not use the local library. (The level of literacy in the sample is quite high; see Table 3.7.2). They also feel that they have travelled less this year than last year. (Note that all the information reported here is based upon the dominant tendencies in the cross-tabulations. For example, those who prefer telephone are predominantly people who have seen television, whereas those who prefer other media are about equally divided between the "have seen TV " and "have not seen TV" categories.)

This pattern is repeated as we look at local and long distance calling behaviour, and preferences for business communication. That is to say, most respondents who have made a local or long distance call "today or yesterday" have seen TV in Frobisher, possess tape recorders, didn't go to a movie,

	NATIVE			NON-NATIVE		
	CD	CL	IG	CD	CL	IG
Speaks Inutitut only	9	11	23	N/A	2	3
Speaks English only	-	-	2	N/A	2	4
Speaks French only	-	-	-	N/A	-	-
Speaks Inut. and French/English	6	6	4	N/A	-	1

	NATIVE			NON-NATIVE		
	CD	CL	IG	CD	CL	IG
Reads Inutitut only	9	12	26	N/A	0	3
Reads English only	-	-	1	N/A	-	-
Reads French only	-	-	-	N/A	-	-
Reads Inut. and French/English	6	5	2	N/A	1	1

Table 3.7.2 Language skills in the interview sample.

don't use the library, and so on. Similarly, those preferring the telephone over letter or travel for business communication follow this pattern. This pattern implies that use of the various types of communications services available has become an established behavioural pattern in the Eastern Arctic. The exceptions - magazines, libraries, and movies - are not remarkable, for magazines are not regularly available, the libraries are small, with few books in the native language, and there is little variety in the films (mostly westerns).

It would seem reasonable to expect cultural differences to be reflected in the interview data. The proportions of non-native respondents in Igloolik, Cape Dorset, and Clyde River are 25%, 0% and 21%, respectively. Except in Cape Dorset, the proportions of non-natives in the sample are higher than the proportions of non-natives in the corresponding total populations; in Cape Dorset, of course, the sample proportion is too low.

For the most part, natives and non-natives respond to the interview questions in similar ways. For example, proportions owning radios, tape recorders, and record players are similar in the two cultural groups. Proportionately fewer natives than non-natives read magazines on a weekly basis (12% versus 18%), fewer natives use the library (15% versus 34%) and fewer natives go to the movies (42% versus 50%). On the other hand, proportionately more natives read newspapers at least once a week (73% versus 60%), and more natives feel that they have travelled less this year than last (80% versus 60%). Since we do not have time-series data covering the interview year (1974) we cannot determine the relationship of this "feeling" to actual travel.

In the case of the telephone, 100% of the non-native sample in Igloolik subscribes, and 79% of the native sample subscribes; our sample for Cape Dorset does not include non-natives, and no one can subscribe in Clyde River. Equal proportions (67%) of natives and non-natives prefer telephone to other modes of communication for social "visits," but more non-natives prefer the phone for business communication (75% versus 50%). As for telephone usage, non-natives tend to have made local, long-distance, or HF calls more recently ("yesterday or today"), whereas the "last calls" by natives are more distant in time (a week, a month, or even a year away in the case of LD telephone calls). So there are some differences, but not a clear-cut division between native and non-native behaviour with respect to communication services.

Finally, let us look more closely at travel frequency. Of those answering the question on travel (74 out of 93), 80% believed they travelled less this year than last year, and 20% believed they travelled more. Roughly 60% of both those travelling more and those travelling less preferred the telephone to letter or travel as a mode of "visiting" outside their community. Similarly, about half of both factions made a local call "today or yesterday," and roughly 60% of both factions made long-distance calls within the past year. We do not find here a simple division between those who travel and those who telephone.

CHAPTER 4

DRAWING CONCLUSIONS

CONCLUSIONS

Residents of the Eastern Arctic - native and non-native - appear to have well-developed patterns of behaviour with regard to the communications services available to them. Those who make local telephone calls, for example, tend to own record players, tape recorders, and even radios (although the quality of reception is minimal). They also tend to read newspapers at least weekly, and have experienced television in Frobisher Bay or in the south. The same pattern generally holds for those who make long-distance calls (see Chapter 3, Section 7).

Telephone is generally the preferred medium for social and business exchanges. The long-distance service available in Igloolik (via Anik) and Cape Dorset (via HF) is unanimously preferred to the HF radiophone which previously was the only service, and still must be used to reach communities lacking exchanges. In Clyde River, where HF radiophone is the only service available, there is unanimous preference for the "real telephone" among those who have used it in other communities.

In the case of non-native residents, this affinity for the telephone is not surprising. For the most part, non-natives in the Arctic have grown-up in the culture to the south, and have come north as adult members of an industrialised society; most were born in communities where telephones were taken for granted. On the other hand, native adults have grown up in a period of rapid transition. The nomadic hunter has been largely transformed into a sedentary wage-earner. The native adult knows the ways of industrialised society both because he has visited it - for work or study - and because it increasingly visits him. The evidence indicates that native adults are acquiring ways of using communication services very similar to those of non-natives reared in a culture which is more "technologically developed" (that is to say, a culture which has a greater wealth and variety of specialised tools - including the telephone - and in which use of these tools is more pervasive).

There are other signs of increasing acculturation in the

Eastern Arctic. In most communities, fur-trading has dropped to a low level relative to the mid-sixties. Fur trading formed the basis of the "traditional" economy over most of this century. Obviously, its decline has meant the disappearance of a major source of income for the native population. We must assume that the wage-welfare economy has filled the vacuum, for average family incomes and sales have increased in spite of the decline. This change in economic base seems to be an inevitable outcome of the self-reinforcing incursion of an industrialised culture (see chapter on Background). A change of this sort can be expected to have pervasive effects on everyday behaviour - one hunts by the weather, but labours by the clock.

The major exception is Clyde River. In this community fur purchases fluctuate, but at a higher level (relative to 1964 values) than in the other Arctic communities. In fact, there is evidence that Clyde River has by 1973 taken some of the fur trade from other communities (see Chapter 3, Section 5). And while family incomes double or treble in other Arctic communities, incomes in Clyde River - already at low level relative to the others - increase by a modest 50 percent.

We see then that the overall trend in the Eastern Arctic is acculturation, entailing adoption of the ways of industrialised society by native residents. However, we also see that different communities may have different levels of acculturation. In the case of the general economy it would seem that Clyde River remains a more traditional society, with greater dependence upon the fur trade, and the lower average income required to support the hunting family. Some of the information on Cape Dorset (erratic changes in residential telephone subscriptions, few business telephones per 1000 people, high crime rates - see Chapter 3, Section 4) suggests that this community may be in an unstable state betweeen traditional and wage economies. And in Igloolik, the very low crime rate, showing little or no relation to the falling fur trade, perhaps indicates a smooth transition from "traditional" to wage economy in this community (Chapter 3, Section 3).

Looking at the education sector, we see a rapid increase in the proportion of eligible natives entering the school system. In contrast, the proportion of the population in school in Sioux Lookout remains very stable. Significantly, the number of female natives in school keeps pace with the total number of natives; girls were once a liability in the hunting community, but now they are sent off to school.

In all Arctic communities except Cape Dorset, school enrollment begins to rise suddenly in 1965 or 1966 - undoubtedly as a result of the "urbanising" effect of the rental housing program, (in Cape Dorset, the increase begins before 1965 and parallels increases in population). The increase in the proportion of the native population in school means that at least some of the values of the impinging culture are being accepted; and since those in school are systematically exposed to the values of the impinging culture, it also means that the rate of acculturation might be accelerated in a self-reinforcing process.

It is conceivable that these sweeping changes and others are interrelated with changes in the demand for and use of communications services. It might be argued that the advent of, say, the private telephone does not generate new forms of behaviour but merely allows established forms to become more efficient. In other words, use of the telephone substitutes for use of the public HF radio or HF radiophone. However, the interviews indicate that the telephone is frequently used for local calls, from house to house, a feature not available with public HF radio or radiophones.

Once a local exchange is installed, what are the factors associated with growth of subscriptions in these largely native communities? There is an indication in Frobisher that the number of residential phones installed follows a trend parallel to food sales. If there is in fact a relationship between residential subscriptions and food sales, it might best be explained via a common cause, disposable income. That is to say, when incomes reach a level where per capita expenditure on food increases, some of the income is spent on private telephone rental. This is for the moment a very weak hypothesis, since it is only supported by the evidence in Frobisher.

On the other hand, there is an indication in Frobisher, Igloolik, and Cape Dorset that the number of business telephones installed follows a trend parallel to retail sales. If there is in fact a relationship here, it perhaps reflects the operation of a second common cause, namely the level of commercial/ governmental activity, for organisations buy machines and office supplies, but they do not buy food. Since the levels of both retail sales and business tendsto rise abruptly, without parallel influxes of non-natives, it is possible that commercial/ governmental activity is stimulated by a few newcomers or other external influences (e.g. changes in government policy, discovery of mineral deposits, new shops). Here again the link is tenuous, and deserves more detailed study.

If we compare communities, we see that the rates of change in subscriptions in Sioux Lookout and Frobisher Bay are fairly low in the early sixties. A year or two after the upgrading to dial-exchanges in 1964-1965, subscriptions per 1000 people begin to increase more uniformly and rapidly. It would seem that a technological change in service does not have any immediate impact on subscriptions in these communities - possibly because service is well established at the point of upgrading, and telephone density is fairly high.

On the other hand, Igloolik and Cape Dorset have no exchanges at all in the early sixties. Upon installation of dial exchanges in late 1964 there is an immediate surge in subscriptions from 0 to roughly 50 percent of the 1971 value. In both communities, this rate of increase is only equalled, subsequently, when economic conditions (as evident in sales per capita figures) provide the stimulus in 1969. From 1965 onwards, residential and business subscriptions show a uniform and rapid rate of increase in Igloolik. The performance in Cape Dorset is more erratic.

All of this suggests that a technological change - upgrading to dial-exchanges - has different effects on different telephone communities. Where service is more "mature", where subscriptions are relatively close to the saturation level, this technological change has perhaps no immediate impact; economic stimuli seem to be more important. However, where telephone service is minimal, technological change does have a significant immediate effect; in this case it seems to be the establishment of a base-line of telephone density upon which economic factors can differentially play.

Unfortunately, we have no information on telephone usage over this critical period. However, we can look at a second technological change in telephone service occurring with the introduction of Anik in 1973. At this point in time there is no direct change in the quality of service at Sioux Lookout (which has national network service), or at Clyde River (which has HF radiophone), or at Cape Dorset (which has a local exchange connected by HF to the national network). Service between the national network and Frobisher is slightly changed by the transfer from the troposcatter to the satellite link; however, service to other Arctic communities is greatly improved by the change from HF to satellite connection. Finally, Igloolik enjoys the greatest degree of change, from HF only to satellite links with all other communities served by Anik.

Here, we see a pattern similar to that noted in the number of telephone installations. There is no change in the number of long-distance (LD) calls from Sioux Lookout. Clyde River shows considerable change, but it seems part of a continuing trend from 1971, rather than a sudden burst. In Frobisher and Cape Dorset there is growth in the number of calls which might be accounted for by economic factors - growth which might be termed "considerable", except in comparison with the startling eight-fold leap from 1972 to 1973 in Igloolik. There can be little doubt that in this case a technological change in service has a considerable impact on the type of usage primarily affected by this change. Significantly, there is also a relatively large increase in subscriptions in Igloolik in 1973.

Here again we see that a technological change has different effects on "mature" and "immature" telephone communities. Despite the eight-fold leap from 1972, LD telephone traffic in Igloolik is only approaching the Cape Dorset level in 1973 (despite the lower telephone density in Cape Dorset). It is tempting to hypothesize that there are levels of demand for service (perhaps influenced by economic factors) which technological change allows to be realised. In the absence of this change, when telephoning is difficult and line quality is low, people perhaps do without, or utilize some other medium of communication.

There is perhaps some support for this hypothesis in the data on the destinations of LD calls. Generally, as service improves with the introduction of Anik, more calls are placed to other Arctic communities, most of them being sites served by Anik. This is so even in Cape Dorset, which does not directly benefit from Anik. In Igloolik, prior to Anik, all outbound calls must go by HF radio; in other words, all communities are equally difficult to reach. Then, all LD calls in the sample go to Frobisher. After Anik service reaches Igloolik, calls go not only to Frobisher but to Resolute and the south - all via Anik. The increase in traffic from the 1972 level is not spread over a range of available routes, but follows the technically superior route.

Is there a potential demand for communication with other communities lacking the higher quality service? Are other types of communications services used in lieu of the telephone? These are moot points which we cannot fully answer here. Looking at two possible alternatives to the telephone (mail and air travel) we find that where service is well established, growth rate is stable and moderate; where the service is new (due to initiation of regular air service) the growth rate shows rapid acceleration. Interestingly, after rapid growth, the 1973 mail volume per 1000 persons in Cape Dorset and Clyde River surpasses the corresponding values in Frobisher and Igloolik. There is a definite suggestion that in communities with relatively poor telephone contact with other settlements letters are carrying a much greater proportion of the total communications load than in communities with high-quality telephone service. One must remember that it is not impossible to call out of Cape Dorset and Clyde River - it is only more difficult and less rewarding (in terms of line-quality) than in those places served by Anik.

EPILOGUE

The people living in the Eastern Arctic, native and non-native, form a unique social group. In many ways, this group presents an ideal context for the study of the relationship between changes in communications and changes in patterns of behaviour such as trade and travel, for they have experienced rapid transition in their way of life, especially in the economic base of their society. Furthermore, the communities in the area are isolated from one another so that travel and communication become more important, and more accessible to measurement.

At the same time, the uniqueness of this social group limits the generality of the results of this study. But comparisons across cultural, economic, and political boundaries are always problematic. At best, a study made at a single point in socio-economic space will point to meaningful methods, variables, relationships, concepts which can be tested in another context. Just as there is no single method in technology assessment, there is no single answer.

To the reader who has struggled through all of Chapter 3 it is now obvious that we do not have here a tight experimental study with irrefutable conclusions. Rather we have an initial attempt to root out salient factors and establish relationships as the basis for more refined hypotheses. At this stage the approach draws more from the inductive than the logico-deductive method. Clearly, statistical methods are not easily applied to research of this type, involving real-life situations; the crux of the difficulty is establishing that there is more than one case for each analytical category. It is questionable whether statistical methods - which depend on multiple cases for each category - are at all appropriate in this type of endeavour.

This study is unique in that it has collected (through the cooperation of many organisations) detailed information on a large number of social, economic, and communications variables. This data covers 5 communities at different levels of communications service, over a period of 13 years. From this data, a few tentative hypotheses on the interrelation of communications services - particularly the telephone - to social and economic factors have been drawn; at this point, the present study ends.

Hopefully, use of the data will not end here. One suggested route for further research involves continuing the time-series by collecting data on the 25 variables used here for another 3 to 5 years. By the end of this period, all of the Arctic communities will have Anik service; and by then, life in these communities might reach the more stable state indicated in Sioux Lookout.

A second route for further research involves collecting data on the mass media, which have been neglected in the present study. It is likely that in the future radio and TV services will become more widespread in the Arctic. Whether these services should be provided by locals, or fed from the national network, or even barred from the north is currently under debate. Studies of program tastes, media consumption, and of media impact in a general sense are to be recommended.

A third route for further research involves the continuing search for appropriate methodology. As mentioned earlier, statistical methods require at least a few cases in each analytical category - something which we do not and probably cannot have in studies of the present type. Therefore, tools for exploring causal relationships such as factor analysis, cross-lagged correlation, cannot be applied. One appealing alternative is to attempt to produce "living models" of the communities via systems dynamics. The proposal here is to construct and test a community model incorporating the communications sector. The QUIST group at Queen's University (see QUIST, 1971) has already generated such a model for one of the communities studied here (Sioux Lookout). The present study has accumulated a vast store of historical data which could be plugged into models constructed along these lines. Thus, the relationships between variables proposed in these models could be scrutinized by "predicting" events which have already passed in time.

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APPENDIX A

LIST OF VARIABLES

LIST OF VARIABLES

SITES: FB = Frobisher Bay, IG = Igloolik, CD = Cape Dorset,
CL - Clyde River, SL = Sioux Lookout

ABBREV.		VARIABLE, SOURCE AND PERIOD COVERED
1.	AIR C	Aircargo in pounds, In and Out combined; unit toll traffic for major carrier. FB: 1961-73; IG, CD, CL: 1969-73
2.	AIR P	Air passengers, In and Out combined; unit toll traffic for major carrier. FB: 1961-73; IG, CD, CL: 1969-73.
3.	CGO	Sea cargo in pounds, In only; sample of one from population of carriers. FB: 1962-71; IG: 1961-64, 1966-67; CD: 1961-71; CL: 1964-71.
4.	FOOD	Food sales in dollars; sample of one from population of outlets. FB: 1961-73; IG: 1965-73; CD: 1964-73; CL: 1963-73; SL: 1965-73.
5.	FUR	Fur purchases in dollars; sample of one from population of outlets. FB, IG, CD, CL: 1961-73.
6.	INC	Average family income, from all sources; from Kuo, 1974 (see REFERENCES). FB, IG, CD, CL: 1965, 1969, 1971.
7.	MAIL	Mail volume in pounds; In and Out combined; Canada Post and major air carrier. FB: 1961-73; IG, CD, CL: 1970-73, SL: 1967-73.
8.	MESS S	Long distance (LD) telephone messages, southbound into national network; 10-day sample, from Bell Canada. ALL SITES: 1971-74

ABBREV.		VARIABLE, SOURCE AND PERIOD COVERED
9.	MESS T	Long distance telephone messages, total; 10-day sample, from Bell Canada. ALL SITES: 1971-74.
10.	MIN S	Duration of long-distance calls southbound into national network, in minutes; 10-day sample, from Bell Canada. ALL SITES: 1971-74.
11.	MIN T	Duration of long-distance calls, total, in minutes; 10-day sample, from Bell Canada. ALL SITES: 1971-74.
12.	N Pop	Native population; Indian and Northern Affairs, Canada, and Statistics Canada. FB, IG, CD, CL: 1961-73.
13.	NN Pop	Non-native population; Indian and Northern Affairs, Canada, and Statistics Canada. FB, IG, CD, CL: 1961-73.
14.	PROP	Number of crimes against property; R.C.M.P. and Ontario Provincial Police. FB, IG, CD, CL: 1967-73; SL: 1968-73.
15.(a)	PUPINF	School pupils, native female, in grades 1-12; Indian and Northern Affairs, Canada. FB, IG, CD, CL: 1963-73.
(b)	PUPF	School pupils, female, in grades 1-8; Department of Education, Ontario. SL: 1961-73.
16.	PUPOTH	School pupils, non-native; Indian and Northern Affairs, Canada. FB, IG, CD, CL: 1961-73.
17.(a)	PUPTN	School pupils, total native, in grades 1-12; Indian and Northern Affairs, Canada. FB, IG, CD, CL: 1961-73.

	ABBREV.	VARIABLE, SOURCE AND PERIOD COVERED
(b)	PUPT	School pupils, total, in grades 1-8; Dept. of Education, Ontario. SL: 1961-73.
18.	RET	Retail sales of dry goods, in dollars; sample of one outlet in Arctic communities; pooled data from sample of two outlets in Sioux Lookout. FB: 1961-73; IG: 1965-73; CD: 1964-73; CL: 1963-73; SL: 1961-73.
19.	TEL B	Number of business telephones in use; annual measurement made in July, by Bell Canada. FB: 1961-74; IG, CD: 1965-74; SL: 1968-74.
20.	TEL R	Number of residential telephones in use; annual measurement made in July, by Bell Canada. FB: 1961-74; IG, CD: 1965-74; SL: 1968-74.
21.	TEL T	Total number of telephones in use; annual measurement made in December, by Bell Canada. SL: 1961-73.
22.	TOTCC	Total number of criminal code offences; R.C.M.P. and Ontario Provincial Police. FB, IG, CD, CL: 1967-73; SL: 1968-73.
23.	TPOP	Total population; Indian and Northern Affairs, Canada, and Statistics Canada. FB, IG, CD, CL: 1961-73; SL: 1961, 1965, 1971.
24.	VIOL	Number of crimes of violence; R.C.M.P. and Ontario Provincial Police. FB, IG, CD, CL: 1967-73; SL: 1968-73.

VARIABLES NOT TREATED IN THE GRAPHICAL ANALYSIS

	ABBREV.	VARIABLE, SOURCE, AND PERIOD COVERED
25.	AIR CS	Air cargo between south and Frobisher only, in pounds; unit toll traffic for major carrier. FB: 1961-73.
26.	AIR PS	Air passengers between south and Frobisher only; unit toll traffic for major carrier. FB: 1961-73.
27.	ALC	Regional sales of alcohol, in dollars, Frobisher outlet only; Government of the Northwest Territories. FB: 1961-71.
28.	CGO 2	Sea cargo in pounds, In only; second sample from population of carriers. FB: 1961-72; IG, CD, CL: 1971-73.
29.	HOUS	Number of new houses supplied in the Federal Rental Housing Program; Indian and Northern Affairs, Canada. FB, IG, CD, CL: 1967-72.
30.	MAIL S	Mail volume in pounds between South and Frobisher only; major air carrier. FB: 1961-73.
31.	MESS FB	Number of LD calls to Frobisher from Arctic communities; 10-day sample from Bell Canada. IG, CD, CL: 1971-74.
32.	MESS IG	Number of LD calls to Igloolik from Arctic communities; 10-day sample from Bell Canada. FB, CD, CL: 1971-74.
33.	MESS CD	Number of LD calls to Cape Dorset from Arctic communities; 10-day sample from Bell Canada. FB, IG, CL: 1971-74.
34.	MESS CL	Number of LD calls to Clyde River from Arctic communities; 10-day sample from Bell Canada. FB, IG, CD: 1971-74.

	ABBREV.	VARIABLE, SOURCE, AND PERIOD COVERED
35.	MESS NWT	Total number of LD calls to points in the N.W.T.; 10-day sample from Bell Canada. FB, IG, CD, CL, SL: 1971-74.
36.	MIN FB	Duration of LD calls to Frobisher from Arctic communities; 10-day sample from Bell Canada. IG, CD, CL: 1971-74.
37.	MIN IG	Duration of LD calls to Igloolik from Arctic communities; 10-day sample from Bell Canada. FB, CD, CL: 1971-74.
38.	MIN CD	Duration of LD calls to Cape Dorset from Arctic communities; 10-day sample from Bell Canada. FB, IG, CL: 1971-74.
39.	MIN CL	Duration of LD calls to Clyde River from Arctic communities; 10-day sample from Bell Canada. FB, IG, CD: 1971-74.
40.	MIN NWT	Total duration of LD calls to points in N.W.T.; 10-day sample from Bell Canada. FB, IG, CD, CL, SL: 1971-74.
41.	TEACH	Number of school teachers, grades 1-12; Indian and Northern Affairs, Canada. FB, IG, CD, CL: 1961-73.
42.	TELSTAT	Telecommunications status (exchange, radio, TV, etc.), a discrete variable; Bell Canada, CBC, Telsat Canada. FB, IG, CD, CL, SL: 1958-1974.

APPENDIX B: THE INTERVIEW PROTOCOL

NOTE:

English and Inutitut versions of the interview protocol were prepared. The first is reproduced here; the second was translated from the English model by Paul Koasak, in the same format.

For the sake of brevity, only one of the answer-sheets (i.e. the one adjoining the questions on Page 2) is reproduced here. The other answer-sheets follow the same format.

TELECOMMUNICATIONS
INTERVIEW

To the interviewer:

This pamphlet contains the questions which you are to ask during each interview. For details on preparing the answers, please look at the Instruction Booklet. Here are a few points to remember;

1. Tell the people being interviewed that you would like to have their own opinions on the telephone, television and so on. If they have any questions, tell them about the project.
2. At each house, try to interview one adult(over 20 years old) one teenager (13 to 19 years old) and one child (less than 13 years old). Place their names at the top of the last page, so you will get the answers in the proper columns.
3. When the interview is over, you can remove the piece of paper with the names on it, so that the names of the people interviewed will not be known to us or anyone else.Please be sure to tell the people interviewed that no one else will see their answers or know their names. Thank them for their help, and tell them that a report on the opinions of their whole community towards television and so on will be available at the end of this project.

COMMUNICATIONS GROUP

ELECTRICAL ENGINEERING

QUEEN'S UNIVERSITY

TELEVISION

1.(a) Do you have a television set at home?

(b) If you do,is it a black and white,or a coloured set?

2.(a) If you don't have a television,do you watch one somewhere outside your home?

(b) Where?

3.(a) Did you watch any television programs yesterday?

(b) Which ones?

4.(a) Do you remember any good things about the programs that you watched?

(b) Do you remember any bad things about the programs that you watched?

5.(a) Are you going to watch any programs today?

(b) Which ones?

6. Are there any things not now available on your television that you would like to see?

	ADULT	TEENAGER	CHILD
1. (a)	YES NO	YES NO	YES NO
(b)	B/W COLOUR	B/W COLOUR	B/W COLOUR
2. (a)	YES NO	YES NO	YES NO
(b)	______	______	______
3. (a)	YES NO	YES NO	YES NO
(b)	______ ______ ______	______ ______ ______	______ ______ ______
4. (a)	______ ______ ______	______ ______ ______	______ ______ ______
(b)	______ ______ ______	______ ______ ______	______ ______ ______
5. (a)	YES NO	YES NO	YES NO
(b)	______ ______ ______	______ ______ ______	______ ______ ______
6.	______ ______ ______	______ ______ ______	______ ______ ______

WITHOUT TELEVISION SEVICES

1. (a) Have you seen any television programs in other settlements?

   (b) If you have seen programs, where did you see them?

2. What type of things did you watch?

3. (a) Do you think it would be good or bad to get television in this settlement?

   (b) Why?

4. If you get television here, what type of progams would you like to see?

RADIO BROADCASTING

1. Do you have a radio?

2. (a) Did you listen to any programs yesterday?

   (b) Which ones?

3. (a) Did you remember anything good about the program that you listened to?

   (b) Did you remember anything bad about the program that you listened to?

4. Is there anything not now on the radio that you would like to hear?

5. Do you think more radio programs should be made specially for people in this settlement?

6. (a) Are you going to listen to any radio programs today?

   (b) Which ones?

HF RADIC

1.(a) Is there a HF radio in this settlement that you can use to call other settlements?

(b) If there is a HF radio available, how far is it away from your home?

(c) When was the last time that you used the HF radio?

(d) Where did you call to? (for example,"a friend in Ottawa", or "the Co-op in Montreal.")

2.(a) Have you used the telephone service available in other settlements?

(b) Where was that?

(c) Was the service better or worse than the service available in this settlement?

(d) Why?

(e) Would you rather use HF radio or telephone?

(f) Why?

SOUND RECORDINGS

1.(a) Do you have a record-player?

(b) Do you have a tape-recorder?

2. If you buy records or tapes,what kind of music do you buy?

3. Do you use a taperecorder for recording information or sending messages to other people?

TRAVEL

1. When you travel to another settlement, where do you usually go?

2. When you travel to another settlement, is it usually part of your work or is it usually to visit friends or relatives?

3. During this year, do you travel more or less to other settlements than you did last year?

4. When you want to talk with friends or relatives in another settlement, would you rather travel to see them or talk by telephone or send a letter or send a telegram/telex?

5. Can you give a reason for your choice?

6. When you want to do business in another settlement would you rather travel, or by telephone, or send a letter or send a telegram/telex?

7. Can you give a reason for your choice?

TELEPHONE: Local Exchange (1)

1. Do you have a telephone?

2.(a) If you don't have a telephone, do you use one outside your home?

(b) How far is this telephone from your house?

3.(a) When did you last make a telephone call to someone in this settlement?

(b) Where did you make this call to? (for example,to a friend, relative,the store,nursing station,school or other places)

4. Do you make telephone calls to other people in this settlement for any of the following reasons?

a. To save a trip outdoors?

b. To get information?

c. To talk with friends or relatives?

d. For business reasons?

e. Other reasons?

5.(a) When did you last make a telephone call to someone outside this settlement?

(b) Where did you make this call to? (for example,to a friend, relative,the store,nursing station,school,or other places)

TELEPHONE: Local Exchange (2)

6. Do you make telephone calls to people outside this settlement for any of the following reasons?

   a. To save a trip?

   b. To get information?

   c. To talk with friends or relatives?

   d. To talk with someone temporarily out of town for school,work,in hospital,or on a trip?

   e. To talk with someone who lives permanently in another settlement?

   f. For business reasons?

   g. Other reasons?

7.(a) When did you last receive a call from someone outside this settlement?

(b) Where did this call come from?

8. Do you ever have difficulties in using the telephone?

9. Do you use the telephone regularly or only in emergencies?

10. Do you use telex/telegram,or any data services?

PRINTED MEDIA

1.(a) Do you read newspapers,daily,weekly,less than once a week?

(b) Which newspapers?

2.(a) Do you look at magazines, weekly, monthly, less than once a month?

(b) Which magazines?

3.(a) Is there a local library that you can use?

(b) If yes, do you use it?

(c) If not, why not?

4.(a) Are there types of newspapers,magazines or books not available in this community which you would like to read?

(b) Which ones?

5.(a) Did you go to the movies this week?

(b) What kind of movie did you see?

6.(a) Do you remember anything good about the movies that you saw?

(b) Do you remember anything bad about the movies that you saw?

COMMENTS

Do you think that telephone, television and radio have changed your way of life, or will change your way of life in the future?

Can you think of any ways of improving radio, telephone or television service in this settlement?

NAME	NAME	NAME
ADULT	TEENAGER	CHILD
Over 20 years	13 to 19 years	Under 13 years
AGE: ________	AGE: ________	AGE: ________
MALE/ FEMALE	MALE/ FEMALE	MALE/ FEMALE
KADLUNAT/INUIT	KADLUNAT/INUIT	KADLUNAT/INUIT

HOW MANY YEARS HAVE YOU LIVED IN THIS SETTLEMENT?

YEARS: ______	YEARS: _______	YEARS: _______

DID YOU LIVE IN ANOTHER PLACE BEFORE?

PLACE: _________	PLACE: __________	PLACE: __________

WHAT KIND OF JOB DO YOU HAVE NOW?

JOB: _______	JOB: _________	JOB: _________

WHAT LANGUAGES DO YOU SPEAK?

INNUTTITUT/ENGLISH OTHERS	INNUTITUT/ENGLISH OTHERS	INNUTTITUT/ENGLISH OTHERS

WHAT LANGUAGES DO YOU READ?

INNUTTITUT/ENGLISH OTHERS	INNUTTITUT/ENGISH OTHERS	INNUTTITUT/ENGISH OTHERS